THE

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Editorials.

BURYING THE HATCHET.

THE war has come to an end. We do not, unhappily, refer to South Africa, but merely to Red Lion Square. The sanguinary monster who gives his name to that classic spot has given up the fray and ceased from terrifying the neighbourhood. In the language of Bottom the Weaver, he who but lately strutted about lashing his tail and saying "I will roar that it will do any man's heart good to hear me," now assures us that "he will roar as gently as any sucking dove; he will roar as 'twere any nightingale." Poor Bottom got a little mixed in his metaphors, but that is neither here nor there; the meaning is plain enough, and we may all breathe again, knowing that all is well. We are to have uniform Preliminary Examinations, and it appears that the Scottish lion rampant is the victorious beast; he has driven the English lions passant from the field, and is now being lulled to sleep by the sweet music of the Irish harp. What a merciful thing it is that Ireland contributes this harmonious element.

Professor M'Fadyean was somewhat startled by the echo of his own voice at the meeting of 4th July of the Royal College. He proposed that the Educational Institute of Scotland be requested to hold its examinations simultaneously in London, Edinburgh, Glasgow, and Dublin, and yet seemed scarcely to realise that this was a concession to Scotland and a justification of the policy upheld by the Scottish members. Whether the learned Professor made his motion in the belief that the Educational Institute is the best examining body in the country, or because he sincerely desired harmony and uniformity, or because he had a lurking suspicion that, in spite of all that has been said, there is some underlying advantage in the examination of the Institute which he did not wish to let escape, is not quite clear. He seemed somewhat amazed when the present writer put upon his words their clearly implied significance, namely, the Institute examination is to be the examination which is to produce uniformity; but at a further stage of the proceedings he acknowledged that the new examination was created by the Royal College, that it is a special examination for

veterinary students, and that it is so labelled and advertised. He went on to say that he had no wish to discuss the wisdom of the action which the Council took in April when it created the examination, and this admission need not be taken as a proof of the Professor's modesty and humility, but rather as a proof of his shrewdness and a mark of his approval, for in the next sentence he takes Professor Penberthy to task for merely questioning the matter, and threatens to brand him as an enemy of uniformity for even that mild offence. He says, "We are in the meantime committed to sanction this examination," which is undeniable; he might have added in plain words, "This Scottish examination is clearly destined to be the veterinary examination *par excellence;* let us be proud of having something that is entirely our own, and let us make the most and the best of it."

The Educational Institute has since the date of the meeting agreed to hold its examinations at the four towns proposed by Professor M'Fadyean, so that now all the natural and justifiable fears of Professor Mettam and Professor Dewar are removed. It only remains for us all to co-operate heartily in making the examinations a success. Professor Penberthy ought to be thankful that the hatchet has been at last buried, and must not threaten its resurrection by vague talk of lowering the standard any farther, when he knows that the latest move has been rather in the other direction. Professor M'Fadyean must try to get quit of his hectoring tone, and not attempt to bully the Educational Institute by talking of the "ample power" which he possesses over that body. The Institute is an honourable and quite capable corporation, and will do credit to our choice; we for our part feel quite sure that its examinations —*the* veterinary examinations of the future—will give so much satisfaction that the braves who have just buried the hatchet of war will never think of digging it up again, but will meet together in Red Lion Square, or elsewhere, and drink to the success of the new arrangement.

TUBERCULOSIS.

To state that because a person who drinks milk containing tubercular organisms, and is not thereafter affected with tubercular ulceration of the bowels, is a proof that that milk is innocuous, or that the bacilli in that milk will not cause tuberculosis in that person is unwise, because it is merely an attempt to prove a negative which is proverbially a difficult task.

It is well recognised that all organisms, whether vegetable or animal, have a preference for certain soils, places, or habitats: for example, ferns don't care for sunshine, *as a rule,* and much prefer damp, sheltered places, but there are exceptions to this rule. The organism of smallpox, even though it gains entrance to the system by means of the lungs or the digestive apparatus, prefers to grow

in and about the skin, *but not always.* The organism of typhoid, even though it gains entrance by the lungs, prefers to grow in the bowels, and only in special parts of the bowels, *usually.* The organism of tuberculosis has its special likings, and it is only under compulsion that it will grow, and then with difficulty, in certain situations, such as in the skin and in the bowel, *occasionally.* I think it is pretty well accepted that a great majority of cattle contract tuberculosis when they are young, but that the conditions for the visible and harmful development of the disease are so antagonistic in healthy young stock that we seldom or never see the signs of the disease until after death. At the same time, if we lower the vitality of these young animals, we soon develop the growth of the organisms, and soon have outward and visible sign of the disease, or indications of a sort which are easily recognised. It must be remembered that organisms belong to plant life, that we as yet are only on the border of this miniature forest, that we only recognise a few of the trees in it, and then only by some superficial marks which we consider distinctive, but these marks are daily being shown to appertain to other varieties of plants as well. This new branch of botany—for it is nothing else—will take much study, and we shall probably find, as we get more familiar with these plants, that they have many varieties and varying powers under varying conditions.

Let us not be too hasty and say that because an organism doesn't cause a disease when introduced into a living body that organism *cannot* produce disease. It is not for us to upset the equilibrium of life; if we do, we shan't last long: but it is for us to guard against the attacks of things that may be harmful to us. All creatures, whether animal or man, have a choice of food. Every effort should be made to prevent noxious organisms from feeding on the human body. I doubt not but that every organism has its special function in maintaining life's equilibrium, but is always ready to take advantage of circumstances and become, like Cæsar or Napoleon, anxious to have all the world to itself. Let us prevent this tyranny by all possible means.

Royal College of Veterinary Surgeons.

THURSDAY, *4th July* 1901.

PRIOR to the usual Quarterly Meeting, a meeting of the Council was held for the purpose of electing a President, six Vice-Presidents, and Secretary and Registrar for the ensuing year.

Present:—Mr. A. C. Cope in the Chair; Vet.-Col. Duck, Vet.-Col. Lambert; Professors Dewar, M'I. M'Call, M'Fadyean, Mettam, Penberthy, Shave, and Owen Williams; Messrs. Abson, Bower, Hartley, Lawson, Locke, M'Kenna, Mulvey, Shipley, Simpson, Trigger, Villar, Wartnaby, Wragg.

Mr. MULVEY said he had great pleasure in proposing the election of Mr. Alexander Lawson, of Manchester, as President. That gentleman had been a member of the Council for some years, regular in his attendance, and had given his best support to the business of the Body Corporate. He thought Mr. Lawson would fill the post with credit to himself and honour to the profession.

Mr. ABSON seconded the motion, which was carried by acclamation.

Mr. Cope then vacated the Chair, which was taken by Mr. Lawson.

Mr. LAWSON, in acknowledging his election, said he appreciated the honour very greatly, the more so on account of the fact that his father had been President of the Council some thirty years ago, and had he been alive nothing would have pleased him more than to see his son occupying the position to which he had just been elected.

On the motion of Mr. TRIGGER, seconded by Mr. SIMPSON, the following gentlemen were elected as Vice-Presidents for the ensuing year :—Mr. Cope, Professor W. O. Williams, Mr. Abson, Mr. Mason, Mr. Bower, and Vet.-Col. Duck.

Mr. MULVEY said he had great pleasure in proposing that Mr. Wragg be re-elected Treasurer of the College. Mr. Wragg had performed his duties so well for so many years that it would be difficult to replace him.

Mr. LOCKE seconded the motion, which was agreed to.

Mr. WRAGG thanked the Council for the honour they had again conferred upon him, and for the manner in which his re-election had been received.

On the motion of Mr. COPE, seconded by Colonel LAMBERT, Mr A. W. Hill was unanimously re-elected Secretary and Registrar.

Mr. SIMPSON said he had much pleasure in proposing a vote of thanks to Mr. Cope for his services as President during the past year. Mr. Cope had proved not only a figurehead, but he had attended faithfully and well to the business of the Council, and had carried out the duties pertaining to his office with the utmost satisfaction of the whole profession.

Mr. MULVEY, in seconding the motion, said he endorsed every word which had fallen from Mr. Simpson.

The resolution was then put, and carried by acclamation.

Mr. A. C. COPE, in acknowledging the vote of thanks, said that, like many another man who looked back to his past, he saw in how much he had failed and how little he had done, compared with what he might have done had he been better acquainted with his duties. It was something, however, for the Council to know that they had some one in the Chair who had endeavoured to do his best. If what he had done had met with satisfaction, he was extremely grateful.

QUARTERLY MEETING.

Present—Mr. Alexander Lawson, President, in the Chair ; General Sir Frederick Fitzwygram, Vet.-Col. Duck, Vet.-Col. Lambert ; Professors Dewar, M'I. M'Call, M'Fadyean, Mettam, Penberthy, Shave, W. O. Williams, Messrs. Abson, Bower, Hartley, Lawson, Locke, Mason, M'Kinna, Mulvey, Shipley, Simpson, Trigger, Villar, Wartnaby, Wragg.

On the motion of Mr. MULVEY, seconded by Mr. MASON, the minutes of the previous meeting were taken as read and confirmed.

The SECRETARY stated that he had received letters from Principal

M'Call, Mr. Barrett, and Mr. Carter regretting their inability to attend the meeting.

The SECRETARY read the obituary list.

Mr TRIGGER said he was sure the Council would agree with him that the profession had rarely sustained a heavier loss than it had done in the death of Dr. George Fleming, who had been a most valuable member of Council and invaluable as an examiner. His name would live long after many of them then present had passed away, and he was sure it was the wish of the Council that an expression of its deep sympathy should be sent to the family of the late Dr. Fleming in their severe affliction.

Mr. ABSON seconded the motion, which was agreed to.

On the motion of Mr. MASON, seconded by Mr. Bower, it was resolved that a letter of condolence be sent to the family of the late Mr. John Freeman.

The SECRETARY read a letter from Mrs. Campbell thanking the Council for its expression of sympathy with her in the recent loss she had sustained.

The SECRETARY read a letter from the Revenue and Statistics Department of the India Office, enclosing copies of Regulations which had been sanctioned by the Secretary of State for India in Council, regarding future appointments to the Indian Civil Veterinary Department. No steps would be taken for making any appointments until the Government of India, after receipt of those Regulations, reported the existence of vacancies, and requested that they might be filled.

Professor W. O. WILLIAMS said that certain conditions were laid down for Veterinary Surgeons which he did not consider proper. He would give notice that he would bring up the subject for consideration at the next meeting.

The SECRETARY said he had received a letter from M. de Regnier, in which that gentleman spoke favourably of a newly discovered injection called " fulgerine," for the treatment of infectious diseases of the lungs, typhoid affections, &c.

The SECRETARY read the following letter from Mr. George A. Banham, dated June 9th, 1901 :—" Your formal notice of a complaint being lodged against me, 'for issuing circulars contrary to bye-law 113,' to hand. I beg to say that I shall be pleased to appear before the Registration Committee, if you will kindly let me know the date and time of its next meeting. I may further say that I should prefer the investigation with 'open' doors, so that any member of the profession can be present, if he so desires, for I strongly disapprove of these investigations taking place with 'closed' doors after the scandalous way the Council treated the Cambridge case. Moreover, I object to four of the members of the Registration Committee sitting in judgment over me, viz., Messrs. Simpson, Mulvey, Penberthy, and Barrett. Even if I have no right to prevent them, still, after my protest—if they are gentlemen—they will refrain from adjudicating upon this case. Of course I have no objection to either of them, or any other member of the profession being present. I am not aware who the informant is, but I hope Messrs. Simpson, S. Bennett, and Wright-Graves will be there, as I might wish to ask them some questions on the case before the Committee. I have no objection to the proceedings being published in our periodicals. In fact the more open 'the trial' the better I shall like it."

Mr. MASON moved that the letter lie on the table.

Mr. WRAGG seconded the motion.

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Professor PENBERTHY was of opinion that the letter ought to be published.

Mr. MASON, in reply, thought it ought to be treated with ignominy.

Mr. Mason's motion was then put and carried.

Mr. VILLAR asked if any reply had been received from the Secretary of the R.S.P.C.A. in answer to the communication addressed to him by the Secretary.

Mr. WRAGG understood that the investigation was not yet completed. When it was he had no doubt the report would be sent to the Council.

PRESENTATIONS TO THE LIBRARY.

The SECRETARY announced the following presentations to the library: —The *Veterinarian* for three months; the *Veterinary Journal* for three months; and the *Calendar* of the Royal College of Preceptors.

Mr. VILLAR moved and Mr MULVEY seconded a vote of thanks to the donors, which was carried.

FINANCE COMMITTEE.

Mr. TRIGGER read the report of the Finance Committee, which recommended that the liabilities be discharged, and that a small special committee be formed to take into consideration the subject of returned voting and annual papers. He moved its adoption.

Mr. LOCKE seconded the motion, which was agreed to.

Messrs. Simpson, Mason, Wragg, and Trigger were appointed Members of the Special Finance Committee.

REGISTRATION COMMITTEE.

Mr. SIMPSON read the report of the Registration Committee, and moved its adoption.

The Committee recommended the restoration to the register of the names of Messrs Hugh Clarke, Shemmonds, and Kirkland-Smith, which had been removed in consequence of non-compliance under section 5, subsection 4, of the Act. The solicitor reported that an unqualified practitioner had been prosecuted, convicted, and fined three guineas and costs. Certain prosecutions were recommended, whilst in other cases the Committee considered the explanation satisfactory, or directed the cases to stand over for further evidence.

Mr. WARTNABY seconded the motion for the adoption of the report, which was carried.

On the motion of Mr. SIMPSON, seconded by Mr. MULVEY, the Seal of the College was affixed to the authority for the prosecution of a member.

EXAMINATION COMMITTEE.

Mr. MULVEY read the report of the Examination Committee, and moved its adoption.

It appeared from the report that all the educational certificates had been carefully examined and, with the exception of five, passed. A letter had been received from Professor Mettam, who said there would be no objection to the two class "B" students of his College being examined in London, the Royal College paying the expenses. The Committee recom-

mended that the out-of-pocket expenses be paid in a sum not exceeding £5 each student—this not to be regarded as a precedent.

Mr LOCKE seconded the motion, which was agreed to.

REPORTS FROM THE COURTS OF EXAMINERS OF THE MEMBERSHIP AND FELLOWSHIP MAY EXAMINATIONS IN SCOTLAND.

On the motion of Mr. MULVEY, seconded by Mr. MASON, the reports were referred to the Examination Committee for consideration and report.

APPOINTMENT OF COMMITTEES.

The following Committees were appointed :—

President and Member of all Committees.

Alexander Lawson.

Registration Committee.

Mr. Abson.
Mr. Barrett.
Mr. Bower.
Mr. Byrne.
Mr. Carter.
Professor Dewar.
Mr. Dollar.
Mr. Fraser.
Mr. Hartley.
Mr. Mason.
Professor M'Call.
Professor M'I. M'Call.
Mr. M'Kenna.
Mr. Mulvey.
Professor Penberthy.
Mr. Shipley.
Mr. Simpson.
Mr. Trigger.
Mr. Wartnaby.
Professor W. O. Williams.
Mr. Wragg.

Examination Committee.

Mr. Allen.
Mr. Barrett.
Mr. Carter.
Mr. Cope.
Professor Dewar.
Colonel Duck.
Colonel J. D. Lambert.
Mr. Locke.
Mr. M'Kinna.
Professor M'Fadyean.
Professor M'Call.
Professor M'I. M'Call.
Mr. Mason.
Professor Mettam.
Mr. Mulvey.
Professor Penberthy.
Professor Shave.
Mr. Simpson.
Mr. Villar.
Professor W. O. Williams.
Mr. Wragg.

Parliamentary and General Purposes Committee.

Mr. Allen.
Mr. Barrett.
Mr. Bower.
Mr. Byrne.
Mr. Cope.
Colonel Duck.
Mr. Dollar.
Mr. Fraser.
Mr. Hartley.
Mr. Mason.
Professor M'Call.
Professor M'I. M'Call.
Professor M'Fadyean.
Professor Mettam.
Mr. Mulvey.
Professor Penberthy.
Mr. Simpson.
Mr. Trigger.
Mr. Villar.
Mr. Wartnaby.
Professor W. O. Williams.
Mr. Wragg.

Finance Committee.

Mr. Abson.
Mr. Allen.
Mr. Barrett.
Mr. Bower.
Mr. Dollar.
Mr. Fraser.
Mr. Locke.
Mr. Mason.
Mr. Mulvey.
Professor Penberthy.
Mr. Shipley.
Mr. Simpson.
Mr. Trigger.
Mr. Villar.
Mr. Wartnaby.
Mr. Wragg.

Library and Museum Committee.

Mr. Allen.
Mr. Barrett.
Mr. Bower.
Mr. Carter.
Mr. Dollar.
Mr. Hartley.
Professor M'Fadyean.
Mr, Mulvey.
Professor Penberthy.
Professor Shave.
Mr. Wragg.

XUM

Publication Committee.

Mr. Barrett.	Professor MacFadyean.	Mr. Simpson.
Mr. Dollar.	Professor Mettam.	Mr. Villar.
Mr. Fraser.	Mr. Mulvey.	Professor W. O. Williams.
Professor M'Call.	Professor Penberthy.	Mr. Wragg.
Professor M'I. M'Call.		

ELECTION OF AUDITORS.

Mr. MASON moved, and Mr. BOWER seconded, that Messrs. Woodger and Warner be re-elected auditors for the ensuing year. Agreed to.

THE WALLEY MEMORIAL PRIZE.

It was resolved that the next examination for the Walley Memorial Prize be held on the 5th October next.

COUNCIL MEETINGS.

It was resolved that the Council Meetings for the ensuing year be held on October 10th, 1901, January 10th, April 11th, and in July, within a month of the Annual Meeting 1902.

DATE OF EXAMINATIONS.

It was resolved that the Written Professional Examination be held on Friday, December 13th, in London, Edinburgh, Dublin, and Glasgow. Also, that the May Examination be held on the 16th and 20th, and that the July Examination be held on the 11th and 15th of that month.

APPOINTMENT OF EXAMINERS.

The following nominations were received in the place of the late Dr. George Fleming for the Membership Examination :—Anatomy of Domesticated Animals, Class B.—E. F. de Jong, F.R.C.V.S., F.R.S.E., L.R.C.S. & P., Edin. & Glasg.; J. M'Lauchlan Young, F.R.C.V.S., F.R.S.E., F.R.P.S.; William Pritchard, M.R.C.V.S.; E. Wallis Hoare, F.R.C.V.S.; David M'Gill, F.R.C.V.S.

On the ballot being taken, Mr. G. Wallis Hoare was declared to be elected, the voting being—Mr. E. Wallis Hoare, 12; Mr. de Jong, 6; Professor William Pritchard, 6; Mr. M'Lauchlan Young, 0; Mr M'Gill, 0.

The following nominations were received for the Fellowship Examination—Veterinary Hygiene and Sanitary Science :—R. Moore, F.R.C.V.S., J. A. Nunn, F.R.C.V.S.; J. M'Lauchlan Young, F.R.C.V.S., F.R.S.E., F.R.P.S.; William Pritchard, M.R.C.V.S.; David M'Gill, M.R.C.V.S.; W. Hunting, F.R.C.V.S.

On the ballot being taken, Mr. Hunting was declared to be elected, the voting being—Mr. Hunting, 13; Mr. Nunn, 9; Professor Pritchard, 2; Mr. Moore, 0; Mr. Young, 0; Mr. M'Gill, 0.

APPOINTMENT OF TRUSTEE IN THE PLACE OF THE LATE DR. FLEMING.

Professor PENBERTHY said he had great pleasure in proposing that Mr. Cope be elected trustee in the place of the late Dr. Fleming. It was not often the Council had the opportunity that was now offered of performing a grateful act to one who had served it so well. No words were necessary

to commend Mr. Cope, for he had the confidence of everybody in the profession.

Mr. TRIGGER seconded the motion.

Mr. MASON, while endorsing what had fallen from Professor Penberthy, thought there was another gentleman who had done loyal work for the profession. Mr. Mulvey was senior to Mr. Cope in the chair, and had also been a very hard worker on the Council. He begged to move the appointment of Mr. Mulvey as trustee.

Mr. WRAGG seconded the amendment.

A ballot was taken, and Mr. Cope was declared to be elected, the voting being—Mr. Cope, 13; Mr. Mulvey, 7.

MOTION BY MR. COPE.

Mr. A. C. COPE moved—"That Dr. Bang, Veterinary Adviser to the Danish Government, be elected a Foreign Associate of the R.C.V.S." Dr. Bang, he said, was an ornament to the profession in the country in which he lived, and it was an honour to the College to think there should be a man in the veterinary profession who had taken so prominent an interest in the subject to which he had devoted so much of his time, namely, tuberculosis. He believed it was Dr. Bang's intention to attend the forthcoming Congress, when he hoped they might have the pleasure of welcoming him in some form or other together with other distinguished members of the profession from the Continent.

Professor PENBERTHY seconded the motion, which was agreed to.

MOTION BY PROFESSOR M'FADYEAN.

Professor M'FADYEAN, in explaining the circumstances which had induced him to give notice of the resolution standing in his name, said the Council was well aware that an important alteration had been made in the bye-law with regard to the examination in general knowlege at the meeting in April last, when a motion was carried recognising a special examination conducted by the Educational Institute of Scotland. One of the strongest reasons brought before the Council was that circumstances had arisen which made the examination as conducted in England and Scotland unequal, and it was probably that representation which had induced the Council to amend the bye-law. It was natural in England there should be a desire that the students should be submitted to the same examination. He need hardly say that that implied a belief that the examination was not more difficult than that for which the students usually presented themselves, and it would be the nearest approach to ensuring uniformity in the severity of the test. He had written to the secretary of the Educational Institute of Scotland with the view of arranging for a branch examination to be held in London simultaneously with the examination to be held in Edinburgh and Glasgow. As no satisfactory answer had been obtained, he thought it desirable to bring the matter before the Council. Since giving notice of the resolution, he had received a courteous reply from the Secretary of the Educational Institute, and arrangements had been made whereby Branch Examinations should be held in London simultaneously with those held in Edinburgh and Glasgow. There was therefore no further motive for the resolution standing in his name. He understood, however, that Professor Mettam was also desirous that the Irish students should have the examina-

tion open to them, and with that desire he sympathised. On that account he was prepared to move his resolution, because he thought it was well that the Council should intimate to the Educational Institute of Scotland that this special examination should be made available in England and Ireland as well as in Scotland. He was sure every member of the Council was of opinion that, as far as possible, uniformity should be aimed at. He therefor begged to move—"That the Secretary be instructed to write to the Secretary of the Educational Institute of Scotland, intimating that it is the desire of this Council that the special examination for intending veterinary students, sanctioned by the alteration of bye-law 52, passed in April last, should be held simultaneously in London, Edinburgh, Glasgow, and Dublin."

Professor W. O. WILLIAMS said he had much pleasure in seconding the resolution, as it was a matter of gratification to find that all the Colleges seemed to be desirous of having the Educational Institute to examine intending students.

Professor M'FADYEAN protested against such an interpretation being placed upon anything he had said.

Professor W. O. WILLIAMS was at a loss to understand what interpretation he was supposed to have conveyed to the Council. It was extremely satisfactory to find that the veterinary students would not only be examined by the same Board of Examiners for their educational examination, but that they would have the same Board of Examiners they had hitherto had at their professional examination. By adopting Professor M'Fadyean's suggestion they would now examine their own students educationally and professionally.

Professor PENBERTHY asked if there were any precedent for such an action as that proposed by Professor M'Fadyean. Had the Secretary of the College ever before in its history communicated with any educational body holding an examination, asking it to hold examinations here, there, or elsewhere? The matter of standard had already been settled, but he should like to know why the Royal College of Veterinary Surgeons should interfere in a matter with regard to which it had previously taken no cognisance. He had seen remarks, misquoted perhaps, attributed to a gentleman in high position, to the effect that the Council having decided to lower the standard of examination, such and such things would transpire. In the face of that, was the Council to give its sanction to the Secretary carrying on a communication with any educational body? Speaking for himself, he would never give his support to any such action. In his opinion uniformity should be aimed at as far as possible, but the standard should not be lowered.

Professor METTAM did not think that any teacher in a veterinary school wished to lower the standard; what they all desired was uniformity. It was not fair that certain students should be subjected to a higher examination, and, being unable to pass it, should be practically debarred from getting into the profession. He said that advisedly, because with regard to his own students there were practically four bodies from which they could obtain certificates. The first was the Matriculation Examination of the Royal University of Ireland. That examination was held in September and in June, so that if a student did not pass his examination in September he had to defer it till June. The second was the Irish Intermediate Board of Examination, which was held in June only. The students obtained those

certificates before they went into the Veterinary Colleges; but those Colleges had no power over them. It was probably a dereliction of duty on the part of the parents that their boys did not obtain certificates while at school, and consequently, the Intermediate Board of Examination being held in June, if the students had already entered a Veterinary College, they had to pay so much attention to their educational matters that they jeopardised their chances of passing their professional examination. The third was the Public Entrance Examination to Trinity College, Dublin. The fee for that examination was 15 guineas, and it was hardly likely that a veterinary student was going to pay that sum for his Veterinary Certificate. The fourth examination was that of the conjoint Colleges of the Royal College of Physicians and Surgeons. It had been published throughout the length and breadth of Ireland that it was the intention of the Educational Committee of those conjoint Colleges to stiffen the forthcoming October examination. The examination was being gradually elevated to suit the requirements of the General Medical Council from 1896, and it was to be stiffened again in October. He would ask whether it was fair that the veterinary students in Ireland should be required to pass that much stiffer examination when there were other examinations open for them? Personally, he had no desire to lessen the standard of the preliminary examination, but what was required was uniformity. He maintained that it was the duty of the Council to regulate the educational requirements of veterinary students, whether in general knowledge or professional matters. If necessary let them have an examination of their own so long as they had proper control over their students. Professor M'Fadyean's proposition moved in that direction, that there should be a uniform examination which students need not be ashamed of passing.

Professor DEWAR, whilst sympathising with the remarks which had fallen from Professor Mettam, thought that the Council had no power over the Educational Institute of Scotland with regard to the examination. He suggested that Professor Mettam should take the same course that Professor M'Fadyean had already done, and ask the Educational Institute to hold an examination in Dublin. In the event of that body not complying with the request, it would then be for the Council to interfere with the matter and to make some arrangements whereby there should be, as far as possible, uniformity in the preliminary examination of veterinary students.

Professor METTAM said that would cut the ground from under their feet, as there was no meeting until next October.

Professor M'FADYEAN, in reply, thought that Professor Penberthy in his remarks had not been quite so logical as his fellow-councillors would admit he usually was. Professor Penberthy wanted to know whether there was any precedent for such an action as he (Professor M'Fadyean) had proposed the Council should take. He would point out that there was no precedent for the action taken by the Council in April last when the Council past a resolution bringing into existence a special examination for veterinary students. He ventured to think that no one would deny that this was a special examination for intending veterinary students, because the Educational Institute had so labelled it. The wisdom of the action which the Council took in April last could not be discussed on the present occasion, but in the meantime they were content to sanction the examination for intending veterinary students, and he thought that was a sufficient answer to Professor Penberthy's inquiry as to whether there was any pre-

cedent for asking the Secretary to communicate with any of those examining bodies. Every other examining body in the list was a public examining body, but not one held examinations especially for intending veterinary students. He would point out that Professor Penberthy's attitude was difficult of explanation unless he was not in favour of uniformity in the examination. If the Council refused to do what he (Professor M'Fadyean) was anxious they should do, where were they? They were simply in this position, that the examination might be an objectionable one, but nevertheless it would be held. It would be held in Edinburgh and Glasgow, and as a matter of special favour it might continue to be held in London, but they had no assurance that it would be held in Dublin. He thought the Council would agree that as a matter of justice intending Irish veterinary students ought to have these examinations available, inasmuch as it was a special veterinary examination. From what Professor Dewar had said it would appear that they had no power over the Educational Institute of Scotland, and that they had better wait until it was seen whether that body acceded to a polite request to conduct the examination in England and in Ireland as well as in Scotland. His (Professor M'Fadyean's) reply to that was that they had ample power over the Educational Institute of Scotland, for the only power which that body possessed to hold a special examination for veterinary students had been endowed by the Royal College, and it could be taken away whenever the Royal College wished.

Professor M'I. M'CALL said it was very gratifying to find that after two or three years' hard fighting and opposition, there was now an examination which Professor M'Fadyean and all the other teachers in the Veterinary Colleges were satisfied as being that which was required. He felt sure it was the duty of the Council to ask the Educational Institute to extend their favours to both Ireland and England. He begged to support Professor M'Fadyean's motion.

The motion was then put and carried.

On the motion of Mr. WRAGG, seconded by Mr. TRIGGER, a vote of thanks was passed to the President.

The meeting then terminuted.

Royal College of Veterinary Surgeons.

10 RED LION SQUARE,
July 1901.

AT Meetings of the Board of Examiners, held in London and Dublin on July 12th for the written, and on and between July 16th and 19th inclusive, the following gentlemen passed their final examination, qualifying them to be Members of the Royal College of Veterinary Surgeons:—

Messrs. H. Anthony, J. Adamson, J. F. Angwin, E. P. Argyle, G. H. Broad, G. H. Barber, G. S. Bruce,* W. H. Edwards, W. H. Chase,* J. Harrison, F. Hopkin, H. S. Howard-Jones, G. May, J. Nicholas, E. S. Oliver,* W. T. Olver,† R. Paine, S. F. G. Pallin, E. M. Perry, F. W. Robards,† H. Greenfield,* R. J. Sargent, A. G. Saunders, W. E. Schofield, and C. E. Turvill.

Dick Veterinary College, Edinburgh.—Mr. F. Harper.

The following passed their Third Examination :—

Messrs. A. Cornish-Bowden, J. Craig,* D. R. Davis, S. Dodd,* J. C. Fitzgerald, N. Gilford, T. S. Green,* A. Goodall,* J. R. Godbold,* H. G. Gibbs,† J. C. Halley, H. B. Hiles, W. N. Jurgenson, M. F. Kelly, W. P. Loft, J. H. Lyons, L. M. Magee, G. P. Male,* G. E. Owen, F. O. Parsons, G. H. Rainforth, G. Sutton,* F. W. H. Thomas, C. W. Townsend,* H. Turnbull, W. G. Wragg,* A. H. Watson, and S. J. Young.

The following passed their Second Examination :—

Messrs. J. C. Broad, T. Bowett,* W. Cawthorn,† G. A. Dibben, A. N. Foster, H. J. Holness,† R. J. Hills,* T. S. Hunter,† A. S. Leese,* A. R. Lewis, H. P. Lewis, H. Mason,† E. O. Reilly,† F. C. O'Rorke,† F. R. Staples, V. de V. Woodley, and W. H. Walker.

The following passed their First Examination :—

Messrs. J. J. Aveston,* B. B. Brown, R. Bennett,* E. C. Bate, J. Blakeway, L. E. M. Beran,* E. Brown,† J. A. Bosley, R. Casey,* W. T. Collins, W. J. Dale, T. C. Graves,* J. R. Hodgkins,* B. H. Lane, A. Munro, E. S. Martin, R. H. Meade, B. M'Guire, S. H. Nixon, H. Platt, D. Quinlan,* F. V. Steward, W. Urquhart,* R. L. Phillips,† S. Speer, W. Trigger, E. R. H. Woodcock,* and C. W. Woodhouse.

Dick Veterinary College, Edinburgh.—T. T. Jack.*

Royal Veterinary College, Dublin :—

Messrs. A. Baker, M. Barlow, E. Duncan, T. T. Henry, E. P. Hearne, F. A. Heney, J. Lynch, R. C. Melville, R. Moore, G. W. Tayson, and E. P. White.

Marked thus † passed with 1st Class Honours.
" " * " " 2nd " "

ARTHUR WM. HILL, *Secretary.*

Royal College of Veterinary Surgeons.

WALLEY MEMORIAL PRIZE.

REGULATIONS FOR EXAMINATION.

1. The examination is open to the students of any Veterinary College in the United Kingdom of Great Britain and Ireland, now or hereafter affiliated to the Royal College of Veterinary Surgeons, for education in veterinary science, who shall have, subsequent to the immediately preceding month of October, passed the Class C, or third examination under the present four years course.

2. Candidates intending to compete for this prize must send notice of their intention to the Secretary of the Royal College of Veterinary Surgeons on or before the second Monday in the month of August, after having passed their qualifying examination.

3. The subjects shall be Pathology, Materia Medica, and Hygiene.

4. The examination shall be wholly a written one. The time allowed

for each of the three subjects of examination shall be not less than two hours.

5. An examination shall be held simultaneously in London and Edinburgh on the 5th October at 10 A.M., and also in Dublin in the event of a Veterinary College being established in Ireland.

6. The marks shall be a maximum of 100 in each subject, and an aggregate of 60 per cent. shall be obtained. Failure to obtain 40 per cent. in any one subject shall disqualify.

7. No fee is to be paid by any student competing for the prize.

British Congress on Tuberculosis for the Prevention of Consumption.

THE COMBATING OF TUBERCULOSIS IN THE LIGHT OF THE EXPERIENCE THAT HAS BEEN GAINED IN THE SUCCESSFUL COMBATING OF OTHER INFECTIOUS DISEASES.[1]

BY GEH. MED.-RATH PROFESSOR DR. ROBERT KOCH, DIREKTOR DES INSTITUTS FÜR INFEKTIONS KRAUKHEITEN IN BERLIN.

THE task with which this Congress will have to busy itself is one of the most difficult, but it is also one in which labour is most sure of its reward.

I need not point again to the innumerable victims tuberculosis annually claims in all countries, nor to the boundless misery it brings on the families it attacks. You all know that there is no disease which inflicts such deep wounds on mankind as this. All the greater, however, would be the general joy and satisfaction if the efforts that are being made to rid mankind of this enemy, which consumes its inmost marrow, were crowned with success.

There are many, indeed, who doubt the possibility of successfully combating this disease, which has existed for thousands of years, and has spread all over the world. This is by no means my opinion. This is a conflict into which we may enter with a surely founded prospect of success, and I will tell you the reasons on which I base this conviction.

Only a few decades ago the real nature of tuberculosis was unknown to us; it was regarded as a consequence, as the expression, so to speak, of social misery, and, as this supposed cause could not be got rid of by simple means, people relied on the probable gradual improvement of social conditions, and did nothing. All this is altered now. We know that social misery does indeed go far to foster tuberculosis, but the real cause of the disease is a parasite—that is, a visible and palpable enemy, which we can pursue and annihilate, just as we can pursue and annihilate other parasitic enemies of mankind.

Strictly speaking, the fact that tuberculosis is a preventible disease ought to have become clear as soon as the tubercle bacillus was discovered, and the properties of this parasite and the manner of its transmission became known. I may add that I, for my part, was aware of the full significance of this discovery from the first, and so will everybody have been who had convinced himself of the causal relation between tuberculosis and the

[1] Delivered on Tuesday, 23rd July, at the British Congress on Tuberculosis, held in London, from 22nd to 26th July 1901 inclusive.

tubercle-bacillus. But the strength of a small number of medical men was inadequate to the conflict with a disease so deeply rooted in our habits and customs. Such a conflict requires the co-operation of many, if possible of all, medical men, shoulder to shoulder with the State and the whole population; but now the moment when such co-operation is possible seems to have come. I suppose there is hardly any medical man now who denies the parasitic nature of tuberculosis, and among the non-medical public too the knowledge of the nature of the disease has been widely propagated.

Another favourable circumstance is that success has recently been achieved in the combating of several parasitic diseases, and that we have learned from these examples how the conflict with pestilence is to be carried on.

The most important lesson we have learned from the said experience is that it is a great blunder to treat pestilences uniformly. This was done in former times; no matter whether the pestilence in question was cholera, plague, or leprosy: isolation, quarantine, useless disinfection were always resorted to. But now we know that every disease must be treated according to its own special individuality, and that the measures to be taken against it must be most accurately adapted to its special nature, to its etiology. We are entitled to hope for success in combating tuberculosis only if we keep this lesson constantly in view. As so extremely much depends just on this point, I shall take the liberty to illustrate it by several examples.

The pestilence which is at this moment in the foreground of interest, the bubonic plague, may be instructive to us in several respects.

People used to act upon the conviction that a plague patient was in the highest degree a centre of infection, and that the disease was transmitted only by plague patients and their belongings. Even the most recent international agreements are based on this conviction. Although, as compared with formerly, we now have the great advantage that we can, with the aid of the microscope and of experiments on animals, recognise every case of plague with absolute certainty, and although the prescribed inspection of ships, quarantine, the isolation of patients, the disinfection of infected dwellings and ships, are carried out with the utmost care, the plague has, nevertheless, been transmitted everywhere, and has in not a few places assumed grave dimensions. Why this has happened we know very well, owing to the experience quite recently gained as to the manner in which the plague is transmitted. It has been discovered that only those plague patients that suffer from plague-pneumonia—a condition which is fortunately infrequent—are centres of infection, and that the real transmitters of the plague are the rats. There is no longer any doubt that, in by far the majority of the cases in which the plague has been transmitted by ocean traffic, the transmission took place by means of plague among the ship rats. It has also been found that, wherever the rats were intentionally or unintentionally exterminated, the plague rapidly disappeared; whereas at other places, where too little attention had been paid to the rat plague, the pestilence continued. This connection between the human plague and the rat plague was totally unknown before, so that no blame attaches to those who devised the measures now in force against the plague if the said measures have proved unavailing. It is high time, however, that this enlarged knowledge of the etiology of the plague be utilised in international as well as in other traffic. As the human plague is so dependent on the rat plague, it is intelligible that protective inoculation and the application of antitoxic serum have had so little effect. A certain number of human beings may have been saved from the disease

by that, but the general spread of the pestilence has not been hindered in the least.

With cholera the case is essentially different; it may, under certain circumstances, be transmitted directly from human beings to other human beings, but its main and most dangerous propagator is water, and therefore, in the combating of cholera, water is the first thing to be considered. In Germany, where this principle has been acted on, we have succeeded for four years in regularly exterminating the pestilence (which was introduced again and again from the infected neighbouring countries) without any obstruction of traffic.

Hydrophobia, too, is not void of instruction for us. Against this disease the so-called protective inoculation proper has proved eminently effective as a means of preventing the outbreak of the disease in persons already infected, but, of course, such a measure can do nothing to prevent infection itself. The only way of combating this pestilence is by compulsory muzzling. In this matter also we have had the most satisfactory experience in Germany, but have at the same time seen that the total extermination of the pestilence can be achieved only by international measures, because hydrophobia, which can be very easily and rapidly suppressed, is always introduced again year after year from the neighbouring countries.

Permit me to mention only one other disease, because it is etiologically very closely akin to tuberculosis, and we can learn not a little for the furtherance of our aims from its successful combating. I mean leprosy. It is caused by a parasite which greatly resembles the tubercle bacillus, Just like tuberculosis, it does not break out till long after infection, and its course is almost slower. It is transmitted only from person to person, but only when they come into close contact, as in small dwellings and bedrooms. In this disease, accordingly, immediate transmission plays the main part; transmission by animals, water, or the like is out of the question. The combative measures, accordingly, must be directed against this close intercourse between the sick and the healthy. The only way to prevent this intercourse is to isolate the patients. This was most rigorously done in the Middle Ages by means of numerous leper-houses, and the consequence was that leprosy, which had spread to an alarming extent, was completely stamped out in Central Europe. The same method has been adopted quite recently in Norway, where the segregation of lepers has been ordered by a special law. But it is extremely interesting to see how this law is carried out. It has been found that it is not at all necessary to execute it strictly, for the segregation of only the worst cases, and even of only a part of these, sufficed to produce a diminution of leprosy. Only so many infectious cases had to be sent to the leper-houses that the number of fresh cases kept regularly diminishing from year to year. Consequently the stamping out of the disease has lasted much longer than it would have lasted if every leper had been inexorably consigned to a leper-house, as in the Middle Ages; but in this way too the same purpose is gained, slowly indeed, but without any harshness.

These examples may suffice to show what I am driving at, which is to point out that, in combating pestilences, we must strike at the root of the evil, and must not squander force in subordinate ineffective measures. Now, the question is whether what has hitherto been done, and what is about to be done against tuberculosis really strikes at the root of tuberculosis, so that it must sooner or later die.

XUM

In order to answer this question it is necessary first and foremost to inquire how infection takes place in tuberculosis. Of course, I presuppose that we understand by tuberculosis only those morbid conditions which are caused by the tubercle bacillus.

In by far the majority of cases of tuberculosis the disease has its seat in the lungs, and has also begun there. From this fact it is justly concluded that the germs of the disease, *i.e.*, the tubercle bacilli, must have got into the lungs by inhalation. As to the question where the inhaled tubercle bacilli have come from, there is also no doubt. On the contrary, we know with certainty that they get into the air with the sputum of consumptive patients. This sputum, especially in advanced stages of the disease, almost always contains tubercle bacilli, sometimes in incredible quantities. By coughing, and even speaking, it is flung into the air in little drops, *i..e.*, in a moist condition, and can at once infect persons who happen to be near the coughers. But then it may also be pulverised when dried, in the linen or on the floor for instance, and get into the air in the form of dust.

In this manner a complete circle, a so-called *circulus vitiosus*, has been formed for the process of Infection, from the diseased lung, which produces phlegm and pus containing tubercle bacilli, to the formation of moist and dry particles (which, in virtue of their smallness, can keep floating a good while in the air), and finally to new Infection, if particles penetrate with the air into a healthy lung and originate the disease anew. But the tubercle bacilli may get to other organs of the body in the same way, and thus originate other forms of tuberculosis. This, however, is a considerably rarer case. The sputum of consumptive people, then, is to be regarded as the main source of the infection of tuberculosis. On this point, I suppose, all are agreed. The question now arises whether there are not other sources too, copious enough to demand consideration in the combating of tuberculosis.

Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.

But another possibility of tubercular infection exists, as is generally assumed, in the transmission of the germs of the disease from tubercular animals to man. This manner of infection is generally regarded nowadays as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this Congress also the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

Even in my first circumstantial publication on the etiology of tuberculosis I expressed myself regarding the identity of human tuberculosis and bovine tuberculosis with reserve. Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question undecided. In order to decide it, I have repeatedly resumed the investigations relating to it, but so long as I experimented on small animals, such as rabbits and guinea-pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schütz, of the Veterinary College in Berlin, I will tell you briefly some of the most important.

A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle bacilli taken from cases of human tuberculosis; some of them got the tubercular sputum of consumptive patients direct. In some cases the tubercle bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tubercular sputum almost daily for seven or eight months; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had formed, in which few tubercle bacilli could be found. This is exactly what one finds when one injects dead tubercle bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones; they were absolutely insusceptible to them.

The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation period of about a week the severest tubercular disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin or into the peritoneal cavity or the vascular system. High fever set in, and the animals became weak and lean; some of them died after a month and a half to two months, others were killed in a miserably sick condition after three months. After death extensive tubercular infiltrations were found at the place where the injections had been made, and in the neighbouring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tubercular growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to Infection by the bacillus of bovine tuberculosis as they had proved insusceptible to Infec-

tion by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experiment with swine. Six young swine were fed daily for three months with the tubercular sputum of consumptive patients. Six other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were all killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few grey nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuberculosis had, without exception (just as in the cattle experiment), severe tubercular diseases, especially tubercular infiltration of the greatly enlarged lymphatic glands of the neck and of the mesenteric glands, and also extensive tuberculosis of the lungs and the spleen.

The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep, and goats, into whose vascular systems the two kinds of tubercle bacilli were injected.

Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chauveau, Gunther and Harms, Bollinger, and others, who fed calves, swine, and goats with tubercular material, one finds that the animals that were fed with the milk and pieces of the lungs of tubercular cattle always fell ill of tuberculosis, whereas those that received human material with their food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie, and Frothingham, and their result agreed with that of ours. The unambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of infection which exclude all sources of error, and carefully avoided everything connected with the stalling, feeding. and tending of the animals that might have a disturbing effect on the experiments.

Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however, that these experiments should be repeated elsewhere, in order that all doubts as to the correctness of my assertion may be removed.

I wish only to add that, owing to the great importance of this matter, the German Government has appointed a commission to make further inquiries on the subject.

But, now, how is it with the susceptibility of man to bovine tuberculosis? The question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the experimental investigation of it with human beings is out of the

question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing tubercle bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the case.

In reality, however, it is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first—*i.e.*, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post-mortem material of the Charité Hospital in Berlin ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick's Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3104 post-mortems of tubercular children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated, it is by no means certain that they were due to infection by bovine tuberculosis. It is just as likely that they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle bacilli found in the tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite specially characteristic and convincing results. For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of the cases I have been able to investigate is but small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.

So the only main source of the infection of tuberculosis is the sputum

of consumptive patients, and the measures for the combating of tuberculosis must aim at the prevention of the dangers arising from its diffusion. Well, what is to be done in this direction? Several ways are open. One's first thought might be to consign all persons suffering from tuberculosis of the lungs, whose sputum contains tubercle bacilli, to suitable establishments. This, however, is not only absolutely impracticable, but also unnecessary. For a consumptive who coughs out tubercle bacilli is not necessarily a source of infection on that account, so long as he takes care that his sputum is properly removed and rendered innocuous. This is certainly true of very many patients, especially in the first stages, and also of those who belong to the well-to-do classes, and are able to procure the necessary nursing. But how is it with people of very small means? Every medical man who has often entered the dwellings of the poor—and I can speak on this point from my own experience—knows how sad is the lot of consumptives and their families there. The whole family have to live in one or two small ill-ventilated rooms. The patient is left without the nursing he needs, because the able-bodied members of the family must go to their work. How can the necessary cleanliness be secured under such circumstances? How is such a helpless patient to remove his sputum, so that it may do no harm? But let us go a step further and picture the condition of a poor consumptive patient's dwelling at night. The whole family sleep crowded together in one small room. However cautious he may be, the sufferer scatters the morbid matter secreted by his diseased lungs every time he coughs, and his relatives close beside him must inhale this poison. Thus whole families are infected. They die out, and awaken in the minds of those who do not know the infectiousness of tuberculosis the opinion that it is hereditary, whereas its transmission in the cases in question was due solely to the simplest process of infection, which do not strike people so much, because the consequences do not appear at once, but generally only after the lapse of years.

Often, under such circumstances, the infection is not restricted to a single family, but spreads in densely inhabited tenement houses to the neighbours, and then, as the admirable investigations of Biggs have shown in the case of the densely peopled parts of New York, regular nests or foci of disease are formed. But, if one investigates these matters more thoroughly, one finds that it is not poverty *per se* that favours tuberculosis, but the bad domestic conditions under which the poor everywhere, but especially in great cities, have to live. For, as the German statistics show, tuberculosis is less frequent, even among the poor, when the population is not densely packed together, and may attain very great dimensions among a well-to-do population when the domestic conditions, especially as regards the bedrooms, are bad, as is the case, for instance, among the inhabitants of the North Sea coast. So it is the overcrowded dwellings of the poor that we have to regard as the real breeding-places of tuberculosis; it is out of them that the disease always crops up anew, and it is to the abolition of these conditions that we must first and foremost direct our attention if we wish to attack the evil at its root, and to wage war against it with effective weapons.

This being so, it is very gratifying to see how efforts are being made in almost all countries to improve the domestic conditions of the poor. I am also convinced that these efforts, which must be promoted in every way, will lead to a considerable diminution of tuberculosis. But a long time

must elapse ere essential changes can be effected in this direction, and much may be done meanwhile in order to reach the goal much more rapidly.

If we are not able at present to get rid of the danger which small and overcrowded dwellings involve, all we can do is to remove the patients from them, and, in their own interests and that of the people about them, to lodge them better; and this can be done only in suitable hospitals. But the thought of attaining this end by compulsion of any kind is very far from me; what I want is that the consumptives may be enabled to obtain the nursing they need better than they can obtain it now. At present a consumptive in an advanced stage of the disease is regarded as incurable and as an unsuitable inmate for a hospital. The consequence is that he is reluctantly admitted and dismissed as soon as possible. The patient too, when the treatment seems to him to produce no improvement, and the expenses, owing to the long duration of his illness, weigh heavily upon him, is himself animated by the wish to leave the hospital soon. That would be altogether altered if we had special hospitals for consumptives, and if the patients were taken care of there for nothing, or at least at a very moderate rate. To such hospitals they would willingly go; they could be better treated and cared for there than is now the case. I know very well that the execution of the project will have great difficulties to contend with, owing to the considerable outlay it entails. But very much would be gained if, at least in the existing hospitals which have to admit a great number of consumptives at any rate, special wards were established for them, in which pecuniary facilities would be offered them. If only a considerable fraction of the whole number of consumptives were suitably lodged in this way, a diminution of infection and consequently of the sum-total of tuberculosis could not fail to be the result. Permit me to remind you in this connection of what I said about leprosy. In the combating of that disease also great progress has already been made by lodging only a fair number of the patients in hospitals. The only country that possesses a considerable number of special hospitals for tubercular patients is England, and there can be no doubt that the diminution of tuberculosis in England, which is much greater than in any other country, is greatly due to this circumstance. I should point to the founding of special hospitals for consumptives and the better utilisation of the already existing hospitals for the lodging of consumptives as the most important measure in the combating of tuberculosis, and its execution opens up a wide field of activity to the State, to municipalities, and to private benevolence. There are many people who possess great wealth, and would willingly give of their superfluity for the benefit of their poor and heavily afflicted fellow-creatures, but do not know how to do this in a judicious manner. Here is an opportunity for them to render a real and lasting service by founding Consumption Hospitals or purchasing the right to have a certain number of consumptive patients maintained in special wards of other hospitals free of expense.

As, however, unfortunately, the aid of the State, the municipalities, and rich benefactors will probably not be forthcoming for a long time yet, we must for the present resort to other measures that may pave the way for the main measure just referred to, and serve as a supplement and temporary substitute for it.

Among such measures I regard obligatory notification as specially valuable. In the combating of all infectious diseases it has proved indis-

pensable as a means of obtaining certain knowledge as to their state, especially their dissemination, their increase and decrease. In the conflict with tuberculosis also we cannot dispense with obligatory notification; we need it not only in order to inform ourselves as to the dissemination of this disease, but mainly in order to learn where help and instruction can be given, and especially where the disinfection which is so urgently necessary when consumptives die or change their residences has to be effected. Fortunately it is not at all necessary to notify all cases of tuberculosis, nor even all cases of consumption, but only those that, owing to the domestic conditions, are sources of danger to the people about them. Such limited notification has already been introduced in various places, in Norway, for instance, by a special law, in Saxony by a ministerial decree, in New York and in several American towns, which have followed its example. In New York, where notification was optional at first and was afterwards made obligatory, it has proved eminently useful. It has thus been proved that the evils which it used to be feared the introduction of notification for tuberculosis would bring about need not occur, and it is devoutly to be wished that the examples I have named may very soon excite emulation everywhere.

There is another measure closely connected with notification, viz., disinfection, which, as already mentioned, must be effected when consumptives die or change their residence, in order that those who next occupy the infected dwelling may be protected against infection. Moreover, not only the dwellings but also the infected beds and clothes of consumptives ought to be disinfected.

A further measure, already recognised on all hands as effective, is the instructing of all classes of the people as to the infectiousness of tuberculosis, and as to the best way of protecting oneself. The fact that tuberculosis has considerably diminished in almost all civilised States of late is attributable solely to the circumstance that knowledge of the contagious character of tuberculosis has been more and more widely disseminated, and that caution in intercourse with consumptives has increased more and more in consequence. If better knowledge of the nature of tuberculosis has alone sufficed to prevent a large number of cases, this must serve us as a significant admonition to make the greatest possible use of this means, and to do more and more to bring it about that everybody may know the dangers that threaten him in intercourse with consumptives. It is only to be desired that the instructions may be made shorter and more precise than they generally are, and that special emphasis be laid on the avoidance of the worst danger of infection, which is the use of bedrooms and small ill-ventilated workrooms simultaneously with consumptives. Of course the instructions must include directions as to what consumptives have to do when they cough and how they are to treat their sputum.

Another measure which has come into the foreground of late, and which at this moment plays to a certain extent a paramount part in all efforts for the combating of tuberculosis, works in quite another direction. I mean the founding of sanatoria for consumptives.

That tuberculosis is curable in its early stages must be regarded as an undisputed fact. The idea of curing as many tubercular patients as possible in order to reduce the number of those that reach the infectious stage of consumption, and thus to reduce the number of fresh cases, was therefore a very natural one. The only question is whether the number of persons

cured in this way will be great enough to exercise an appreciable influence on the retrogression of tuberculosis. I will try to answer this question in the light of the figures at my disposal.

According to the business report of the German Central Committee for the Establishment of Sanatoria for the cure of Consumptives, about 5500 beds will be at the disposal of these institutions by the end of 1901, and then, if we assume that the average stay of each patient will be three months, it will be possible to treat at least 20,000 patients every year. From the reports hitherto issued as to the results that have been achieved in the establishments we learn further that about 20 per cent. of the patients that have tubercle bacilli in their sputum lose them by the treatment there. This is the only sure test of success, especially as regards prophylaxis. If we make this the basis of our estimates, we find that 4000 consumptives will leave these establishments annually as cured. But, according to the statistics ascertained by the German Imperial Office of Health, there are 226,000 persons in Germany over fifteen years of age who are so far gone in consumption that hospital treatment is necessary for them. Compared with this great number of consumptives, the success of the establishments in question seems so small that a material influence on the retrogression of tuberculosis in general is not yet to be expected of them. But pray do not imagine that I wish, by this calculation of mine, to oppose the movement for the establishment of such sanatoria in any way. I only wish to warn against the over-estimating of their importance which has recently been observable in various quarters, based apparently on the opinion that the war against tuberculosis can be waged by means of sanatoria alone, and that other measures are of subordinate value. In reality the contrary is the case. What is to be achieved by the general prophylaxis resulting from recognition of the danger of infection and the consequent greater caution in intercourse with consumptives is shown by a calculation of Cornet's regarding the decrease of mortality from tuberculosis in Prussia in the years 1889 to 1897. Before 1880 the average was 31·4 per 10,000, whereas in the period named it sank to 21·8, which means that, in that short space of time, the number of deaths from tuberculosis was 184,000 less than was to be expected from the average of the preceding years. In New York, under the influence of the general sanitary measures directed in a simply exemplary manner by Biggs, the mortality from tuberculosis has diminished by more than 35 per cent. since 1886. And it must be remembered that both in Prussia and New York the progress indicated by these figures is due to the first beginnings of these measures. Considerably greater success is to be expected of their further development. Biggs hopes to have got so far in five years that in the city of New York alone the annual number of deaths from tuberculosis will be 3000 less than formerly. I take this opportunity of most urgently recommending Dr. Biggs' organisation to the study and imitation of all municipal sanitary authorities.

Now, I do indeed believe that it will be possible to render the sanatoria considerably more efficient. If strict care be taken that only patients be admitted for whom the treatment of those establishments is well adapted, and if the duration of the treatment be prolonged, it will certainly be possible to cure 50 per cent., and perhaps still more. But even then, and even if the number of the sanatoria be greatly increased, the total effect will always remain but moderate. The sanatoria will never render the other measures I have mentioned superfluous. If their number become

great, however, and if they perform their functions properly, they may materially aid the strictly sanitary measures in the conflict with tuberculosis.

If now, in conclusion, we glance back once more to what has been done hitherto for the combating of tuberculosis, and forward to what has still to be done, we are at liberty to declare with a certain satisfaction that very promising beginnings have already been made. Among those I reckon the consumption hospitals of England, the legal regulations regarding notification in Norway and Saxony, the organisation created by Biggs in New York, the sanatoria, and the instruction of the people. All that is necessary is to go on developing these beginnings, to test, and if possible to increase their influence on the diminution of tuberculosis, and wherever nothing has yet been done, to do likewise.

If we are continually guided in this enterprise by the spirit of genuine preventive medical science, if we utilise the experience gained in conflict with other pestilences, and aim, with clear recognition of the purpose and resolute avoidance of wrong roads, at striking the evil at its root, then the battle against tuberculosis, which has been so energetically begun, cannot fail to have a victorious issue.

TUBERCLE BACILLI IN COWS' MILK AS A POSSIBLE SOURCE OF TUBERCULOSIS DISEASE IN MAN.[1]

BY PROFESSOR JOHN M'FADYEAN, M.B., M.R.C.V.S.

As recently as a few days ago, when I was mentally arranging the material for the paper which I have now the great honour of submitting to this Congress, I was under the impression that it would not be necessary to formally prove that the term tuberculosis, as it is now employed by medical men and veterinary surgeons, relates to one and the same disease. I thought that I might ask my audience to accept it as proved and generally admitted that tuberculosis in man is caused by a single definite species of organism—the tubercle bacillus—that this organism is also the cause of the disease to which veterinary surgeons apply the term tuberculosis in the case of cattle and other domesticated species, and that there therefore existed a *prima facie* case against the germs formed in the bodies of tuberculousanimals as a possible source of tuberculous disease in human beings.

To-day, however, the position of any one who undertakes to discuss the inter-communicability of human and bovine tuberculosis is very different from what it would have been a week ago, for in the interval the greatest living authority on tuberculosis—the world-renowned discoverer of the tubercle bacillus, and the man to whom we are mainly indebted for our knowledge of the cause of tuberculosis—has declared his conviction that human and bovine tuberculosis are practically two distinct diseases. I do not know how far the reasons assigned by Dr. Koch for the opinion which he now holds on this question may have commended themselves to the members of this Congress, and I am overwhelmed at finding myself in a position which compels me to offer some criticism on the pronouncement of one the latchet of whose shoes I am not worthy to unloose.

That bovine and human tuberculosis are identical diseases was generally supposed to have been finally determined by Dr. Koch himself, when he discovered that the human and the bovine lesions contained bacilli that

[1] Delivered on Wednesday, 24th July, at the British Congress on Tuberculosis, held in London from 22nd to 26th July 1901 inclusive.

were identical in morphological, tinctorial, and cultural characters, and showed that the artificial cultures from both sources produced indistinguishable effects when they were employed to infect a variety of animals. The labours of hundreds of workers during the succeeding eighteen years produced nothing in serious conflict with the conclusion that human and bovine tuberculosis were identical diseases, but they brought to light what appeared to be additional evidence of this identity, such as the discovery that tuberculin produced a specific reaction in tuberculous cattle, whether human or bovine bacilli had been employed in its preparation. In short, the identity of the bacilli from the two sources appeared to be as firmly established as any other generally accepted opinion regarding the identity or non-identity of bacteria associated with disease in more than one species of animal. Since it thus appeared to be proved that the only difference between human and bovine tubercle bacilli lay in their accidentally different position—one being parasitic in man, and the other in cattle—it was natural to conclude that, when circumstances were favourable for the transference of bacilli from one species to the other, human tuberculosis might have an animal origin, and *vice versâ*.

Opinions varied as to the frequency with which this transmission of tuberculosis from one species to the other occurred, but practically never within the last eighteen years regarding the possibility and probability of such reciprocal infection. What are the grounds upon which we are asked to discard convictions that appeared to rest on such a solid basis? I shall endeavour to state them briefly, as I understand Dr. Koch's train of reasoning :—

(1.) The bacilli found in cases of bovine tuberculosis are much more virulent for cattle and other domestic quadrupeds than the bacilli found in cases of human tuberculosis.

(2.) This difference is so marked and so constant that it may be relied upon as a means of distinguishing the bacilli of bovine tuberculosis from those of the human disease, even assuming that the former may occasionally be found as a cause of disease in man.

(3.) If bovine bacilli are capable of causing disease in man, there are abundant opportunities for the transference of the bacilli from the one species to the other, and cases of primary intestinal tuberculosis from the consumption of tuberculous milk ought to be of common occurrence. But post-mortem examination of human beings proves that cases of primary intestinal tuberculosis are extremely rare in man, and therefore it must be concluded that the human subject is immune against infection with the bovine bacilli, or is so slightly susceptible that it is not necessary to take any steps to counteract the risk of infection in this way.

Now, with the utmost diffidence I venture to submit that at least one of the premises contained in this argument is not well founded, that the others have little or no bearing on the question, and that there still remain reasonable grounds for regarding tuberculous cows' milk as distinctly dangerous to human beings.

It cannot be denied that what may be called bovine tubercle bacilli are as a rule distinctly more virulent for cattle and other domesticated animals than human bacilli, or that the results of experiments indicate that in natural circumstances there is little danger of cattle becoming infected

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from human beings. But it cannot be admitted that the low virulence of human bacilli for cattle proves, or even makes it probable, that bovine bacilli have only a feeble pathogenic power for man. That might have been held to be probable if it had been shown that bovine bacilli were very virulent only for cattle, but since it is well established that these bacilli are highly dangerous for such diverse species as the rabbit, horse, dog, pig, and sheep, and, in short, for almost every quadruped on which they have been tried, it appears to be highly probable that they are also dangerous to man. At any rate it is impossible to cite any ascertained fact relating to other bacterial diseases that makes the contrary conclusion probable. It is well known that the majority of disease-exciting bacteria are harmful to only one or two species, but all those that are common to all the domesticated animals are also pathogenic to man.

With regard to the view that the difference between human and bovine bacilli in respect of virulence for cattle is of such a fixed and constant character that it may be relied upon to distinguish the one from the other, it need only be said that that is very far from proved. It appears to be quite possible that what may be called the normal or average virulence of bovine bacilli for cattle may be reduced by passage through the human subject. Besides, there are very great differences in the virulence of tubercle bacilli found in animals of the same species, and if a low degree of virulence for cattle is to be taken as the distinguishing feature of human bacilli, there will be no difficulty in proving that the human disease is sometimes transmitted to the lower animals.

The third proposition in Dr. Koch's argument is the only one which is really germane to the point at issue, viz., that only cases of primary intestinal tuberculosis can possibly have had their origin in infected milk or meat, and that "such cases are extremely rare." Dr. Koch refers to several large series of post-mortem observations that appear to justify this statement, and adds that he could have cited many more pointing to the same conclusion. Now, if it were a fact that all the statistics relating to this point were unanimous, it would have to be admitted that primary intestinal tuberculosis is rare in the human subject, and that cases of infection through milk are still rarer, though even then it might be advisable to take measures to prevent the few cases. But the statistics are not by any means unanimous, and those that are likely to appeal with most force to the people in this country are not at all in accord with those quoted from Germany. During the last few years the evidence obtainable from the post-mortem records of two of the largest hospitals for children in this country have been analysed with great care, in order to see what evidence they afforded as to the relative frequency of the different methods of infection in tuberculosis. In the case of the Hospital for Sick Children in Great Ormond Street this has been done by Dr. George Still, and in the case of the Royal Hospital for Sick Children in Edinburgh by Dr. Shennan. The conclusion at which Dr. Still arrived was that in 29·1 per cent. of the cases of tuberculosis in children primary infection appeared to have taken place through the intestine. That is very far from being an insignificant proportion, and it is a striking fact that Dr. Shennan arrived at an almost identical conclusion, and estimated that 28·1 per cent. of the cases of tuberculosis among children in Edinburgh are due to alimentary infection. There does not appear to be any ground for supposing that there is a large margin of error in these statistics, as the number of cases dealt with was considerable

(547 in the two series), and in both series the post-mortem appearances were interpreted in a way to which no exception can be taken. In face of these statistics it is not possible to assent to the statement that cases of primary tuberculosis of the alimentary canal are extremely rare. Precisely the contrary conclusion is the one that must in the meanwhile be drawn with regard to the state of affairs in this country, viz., that, at least in children, primary infection by way of the alimentary canal is comparatively common.

I therefore submit that there is still a strong *prima facie* case against animal tuberculosis as a possible source of human tuberculosis, and it becomes necessary to consider whether there are any data from which one may estimate the extent of the danger to which human beings are exposed through the occurrence of tubercle bacilli in milk.

The evidence in favour of the view that the ingestion of tuberculous milk is one of the causes of human tuberculosis includes a number of recorded cases in which the relationship of cause and effect appeared to be obvious. From the nature of the circumstances, evidence of this kind is very scanty, and it must be admitted that very few of the alleged examples are absolutely convincing. Tuberculosis is a disease that develops slowly, and, assuming for the moment that tubercle bacilli do occur in milk, and are a cause of disease in persons consuming such milk, it is obvious that, as a rule, the very act by which the infection is brought about destroys the only direct evidence of cause and effect that exists.

One could only expect to be able to trace the disease to the milk when, after the onset of symptoms pointing to infection by way of the mouth, the cow from which the milk had been obtained was still available for examination. In practice this is rarely the case, and it is therefore not surprising that medical literature contains very few specific instances of the infection of human beings with tuberculosis by means of milk. It is obvious, however, that the entire absence of evidence of this kind would in no way exonerate milk from the suspicion of being one of the causes of human tuberculosis.

We have already seen that, at least in this country, in a considerable number of cases of tuberculosis occurring in early life, the first seeds of the disease appear to have entered the body by way of the mouth. What proportion of these cases ought to be ascribed to tubercle-infected milk? It scarcely appears to be possible to give a very confident reply to this question, though some distinguished authorities have not hesitated to express the opinion that practically all the cases of primary intestinal tuberculosis occurring in childhood may be set down to this cause. The late Sir Richard Thorne Thorne, in the Harben Lectures on the administrative control of tuberculosis, which he delivered in 1898, expressed his conviction that tuberculous milk was the main cause of *tabes mesenterica* in children, and he characterised the loss of child life from this cause as appalling. The evidence on which this formidable charge was laid against the milch cow was of the following nature. The Registrar-General's returns show that during the last fifty years there has been a marked decline in the death-rate from human phthisis, which is the form that tuberculosis generally takes when the bacilli are inhaled. On the other hand, during the same period there has been only a slight decline in the death-rate at all ages from that form of tuberculosis which is ascribable to alimentary infection, and among children under one year of age there has

been a notable increase in the mortality from that form of the disease. The decline in the death-rate from phthisis is ascribable to the great improvements which have been effected during the last fifty years in the hygiene of human habitations, such as improvements in lighting, drainage, and ventilation. These, naturally, have not interfered with infection through milk, which has therefore remained unchecked, and in infants has even increased, because, during the last fifty years, cows' milk has entered more largely into the dietary of very young children.

There are several weak points in this argument. Perhaps the weakest of all is the assumption that the deaths certified under the head of *tabes mesenterica* correspond closely with those which the pathologist would classify as cases of primary intestinal tuberculosis. It is scarcely possible to doubt that the term *tabes mesenterica* in the Registrar-General's returns covers a heterogeneous collection of cases, of which the majority may not be cases of tuberculosis at all. But even if it is agreed to accept all the cases registered under the head of *tabes mesenterica* as instances of primary alimentary infection, the figures found in the Registrar-General's returns do not support the contention that milk is responsible for all the cases of *tabes*. It is true that they indicate an increase in the death-rate from alimentary tuberculosis among children under twelve months old, but, on the other hand, there appears to have been a considerable decline in the death-rate from the same cause at all ages between one and five years. Now, if tuberculous milk were a frequent cause of tuberculosis, one would not have expected the death-rate from that cause to decline among children between one and five years of age, for there is no reason to suppose that there has been any decline in the use of cows' milk in the feeding of children at that age during the last fifty years. The fact appears to be that the Registrar-General's returns do not afford much trustworthy information with regard to the number of cases of primary alimentary tuberculosis, and are absolutely worthless as an indication of the extent to which human beings are infected by means of milk.

There is another direction in which one may turn for evidence on this point. We cannot with any pretence to accuracy ascertain the number of persons that annually become infected by milk, but we may be able to form some estimate of the existing danger in this connection by collecting information as to the frequency with which milk contains tubercle bacilli. We know that about thirty per cent. of all the cows giving milk in this country are tuberculous in some degree. This statement no doubt indicates a deplorable state of affairs, but in the present connection it is not quite so alarming as it at first sight appears. Fortunately not every cow that is tuberculous gives milk containing tubercle bacilli. It is true that opinions with regard to this point are not absolutely unanimous, but there is ample evidence to justify the assertion that as a rule the milk is not dangerous until the udder itself becomes diseased. The experiments pointing to an opposite conclusion form only a small minority, and the results obtained in most of them were probably due to carelessness on the part of the experimenter. In a few of the cases in which the milk of an apparently healthy udder was found to be infective, it is probable that the gland tissue was in reality diseased, though not to an extent discoverable without microscopic examination. The important question, therefore, is not what proportion of milch cows are tuberculous, but what proportion of them have tuberculous udders. Some authorities have estimated

this to be as high as 10 per cent., but the proportion is certainly much less than in Great Britain. My own experience leads me to think that about 2 per cent. of the cows in the milking herds in this country are thus affected. Now, the milk secreted by a tuberculous udder always contains tubercle bacilli, and it sometimes contains enormous numbers of them, and when these facts are apprehended one begins to realise the seriousness of the danger to which, in the present state of affairs, those who drink uncooked milk are exposed. But there are one or two considerations which make the danger greater than the mere statement of the number of cows affected would at first sight indicate. In the first place, the udder disease is not attended by any pain or tenderness in milking, and the milk for a considerable time after the udder has become manifestly diseased may appear quite wholesome, though in reality it is charged with the germs of tuberculosis. It therefore often happens that the gravity of the condition is not realised by the milker or the owner of the cow, and the milk continues to be sold for human consumption. There is scarcely any room for doubt that if it were sold and consumed unmixed with other milk, some of the persons partaking of it would become infected. In practice it is usually mixed with the milk from other cows that have healthy udders, and thus the germs are distributed among a larger number of persons. Even tuberculous milk that has been thus much diluted may prove infective, but the danger to the individual consumer is in inverse proportion to the degree of dilution.

Since about one cow in fifty is the subject of tuberculosis of the udder, and the average number of cows in the milking herds of this country is less than fifty, it follows that the majority of dairies and farms supply milk that is free from tubercle bacilli, or at least does not contain any derived from this source. On the other hand, when the infected material is present, it operates with the greatest intensity in the milk of single cows, and in the mixed milk from small herds.

It must be added that tuberculous disease of the udder is not the only source of tubercle bacilli found in milk. A great deal of the milk in the market contains a considerable quantity of dust and dirt, most of which comes from the cow's udder and the hands of the milker, and part from the dust of the air of the cowshed. When thirty per cent. of the cows in a byre are tuberculous, the dirt in that building, and the atmosphere in it, are almost certain to contain tubercle bacilli, and some of these are very likely to find their way into the milk. The more dirt milk contains, the greater is the chance that tubercle bacilli from that source may be present.

What has been said with regard to the extent of the danger to which the public are exposed through the sale of milk containing tubercle bacilli may be summed up as follows:—The danger cannot be defined by stating how many persons are thus infected annually, or what fraction the persons thus infected form of the total number who contract tuberculosis in the course of a year. At the same time, it is impossible to doubt that the danger is a very real one, since at the present time milk is a vehicle by which tubercle bacilli are often introduced into the bodies of human beings.

MEANS OF AVERTING THE DANGER.

The ideal method of counteracting this source of human disease would be to stamp out bovine tuberculosis, or to prevent the sale of milk from

every cow that is tuberculous. Unfortunately it must be admitted that at present that is unattainable. At the present time probably not less than thirty per cent. of all the breeding and milking cattle in this country are in some degree affected with tuberculosis, and to urge that the disease should be attacked on the lines adopted in dealing with cattle plague and pleuro-pneumonia is an effectual method of preventing any Government from touching the subject. But, although the complete and rapid extermination of the disease is impossible, it does not follow that nothing can be done, or ought to be done, in the way of prevention. The disease has attained to its present alarming proportions simply because, until quite recently, altogether erroneous notions were held regarding its cause, and because there has hitherto been the most absolute neglect of the precautions necessary for its prevention. The greatest obstacle to successful action against tuberculosis, whether in man or animals, is the ignorance of the laity regarding the cause of the disease. The immense majority of cattle-owners are not yet convinced that contagion is the only cause of tuberculosis, and very few of them have yet made the slightest effort to check the spread of the disease. As a rule, cows and other cattle visibly ill from tuberculosis are still left alive and in close association with their fellows, although the lowest grade of common sense and prudence would suggest that such animals ought to be promptly killed, or at least isolated. It is not want of common sense, nor is it mainly lack of means, that is responsible for this inaction ; it is simply a want of conviction on the part of cattle-owners that tuberculous animals are dangerous to their companions.

The first thing necessary in this connection is education of the people regarding the cause of the disease. It is necessary, because in this country, where Parliament never moves except by the force of public opinion, the legislative action required will not be taken unless the people are satisfied of its wisdom, and also because even the most drastic sanitary measures enforced by the law are likely to fail if they are not supplemented by the intelligent co-operation of the people. The National Association for the Prevention of Consumption and the Royal Agricultural Society have been endeavouring to disseminate sound views regarding the cause of bovine tuberculosis among farmers and others, but much remains to be done in this direction. But it is not reasonable to ask that things should be left as they are until the education of the farmer in the matter of tuberculosis has been finished. If there are any practicable and reasonable measures by which, figuraitvely speaking, the flow of tubercle bacilli from tuberculous cows to healthy human beings can be stopped or impeded, they ought to be immediately enforced.

As soon as the valuable diagnostic properties of tuberculin had been proved by experience it occurred to a good many people that its assistance ought to be called in in order to exclude tuberculous cows from milking herds. In other words, it was thought that although it might not be practicable to insist upon the application of the tuberculin test to all infected herds, and to compel the isolation or slaughter of all cattle thus found to be infected, it might still be possible to require that only cows found to be free from the disease by the application of the test should be kept for milch purposes. I doubt whether any one who is well acquainted with the circumstances of the case now believes this practicable. Here, again, the fact that one-third of the cows now giving milk are tuberculous is an insurmountable obstacle. The cost of carrying out the tuberculin

test several times annually in all the milking herds in this country would be enormous, and the exclusion of all the reacting cows from such herds would seriously disorganise cattle breeding as well as milk production. Moreover, to rely blindly on the tuberculin test, and to pronounce the milk of every cow that does not react to it free from tubercle bacilli, would be very unsafe. The test is recognised to be one of great value, but it is not infallible. Rather serious defects in connection with it are:—(1) that for a period after infection—a period that is sometimes very considerable—an animal will not react; (2) that in some advanced cases of tuberculosis no distinct reaction is obtainable; and (3) that in a considerable proportion of cases a second reaction is not obtainable for some days or weeks after the first. It is therefore clear that if we wish to exclude the milk of tuberculous cows, or if the object is the more restricted one of preventing the sale of milk from tuberculous udders, some system of inspection is necessary. This was the conclusion at which the second Royal Commission on Tuberculosis arrived. We have already seen that whatever danger attaches to milk comes mainly from the cows with tuberculosis of the udder, and the public health would be almost entirely safeguarded from this danger if we could exclude such animals from our dairies. Periodic examination by competent inspectors would go a long way to securing this object, but the inspection would require to be at rather short intervals, for a tuberculosis of the udder may come into existence and attain most dangerous dimensions in a period of a few weeks. The more frequent the inspection the better, but, of course, this means a great deal of expense.

If every town and rural district produced its own milk, it would be a comparatively simple problem to organise and carry out a fairly efficient system of inspection of milch cows; but as the law at present stands, the majority of the population cannot obtain this safeguard. With the exception of Glasgow, Manchester, and a few other places, a Local Authority has no power to inspect cows outside its own district, and the helpless position in which this state of the law leaves the inhabitants of London and other large towns is obvious. If cows of which the milk is sold for human food had everywhere to be submitted to periodic inspection, such inspection would naturally be undertaken by the various Local Authorities, each of which would supervise the cows and cowsheds in its own district; but the compulsory inspection of all the milch cows in the country would be a very large undertaking, and perhaps it would be premature to press for it. In the meantime a good case can be made out for making general the special powers relating to inspection of cows in outside districts which a few fortunate cities have acquired by special Acts of Parliament. This also was one of the directions in which the members of the Second Royal Commission on Tuberculosis considered immediate action to be necessary.

There remain for consideration some other safeguards which would doubtless be less effective than those just discussed, but which, unlike these, would not be difficult to enforce, viz.:—(1) compulsory notification of udder disease and of any symptoms of tuberculosis in milch cows, with, of course, the power to inflict a considerable fine for not reporting; and (2) the interdiction of the sale of milk from any cow suffering from tuberculous disease of the udder, or exhibiting clinical signs of tuberculosis. Against the demand for the amendment of the existing law to the extent of granting the public these very reasonable safeguards against infection through milk,

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it cannot be urged that they would be very expensive, or that they would press harshly on private interests. The present state of the law, or rather the almost entire absence of any law, dealing with tuberculous udder disease in cows, is a scandal and a reproach to civilisation. It scarcely sounds credible, but it is a fact, that the owner of a cow in the most advanced state of tuberculosis, and exhibiting the most manifest signs of udder disease, may sell that cow's milk for human food as long as the sale has not been specially interdicted on the certificate of a veterinary surgeon, and no penalty attaches to this crime of deliberately or carelessly placing on the market a food material charged with the germs of a dangerous disease.

In the interests of public health, the sale of milk from tuberculous udders, and from cows that are obviously tuberculous in any part of the body, must be stopped, and it must be declared illegal to keep such animals alive. There need be no hesitation in pressing for this reform, because the measures demanded are in the interests of the owners of cattle, and would be advisable even if it were established that bovine tuberculosis is not transmissible to man. There is no dispute as to the danger of visibly tuberculous animals to others of their own species, and it is the very reverse of a hardship to the owner of such animals to insist on their being slaughtered.

It would probably be regarded as a serious omission if I did not refer to one other method of counteracting whatever danger at present attaches to impure milk as a cause of human tuberculosis. No matter how highly charged milk may be with tubercle bacilli, it can be deprived of all danger from that source by raising it to the temperature known to be fatal to these germs. Less than the boiling temperature (212° F.) suffices for this purpose; but, unfortunately, the lowest temperature that can be relied upon imparts to the milk a flavour that many people find distasteful. That objection does not hold good in the case of infants and young children, and the custom of boiling or steaming the nursery milk for a few minutes cannot be made too general. But while abstinence from uncooked milk is a sure way of avoiding infection with bacilli present in that article of food, it cannot for a moment be admitted that this absolves public health authorities from all concern with the subject. Arsenical beer may be made harmless by adding the proper antidote before drinking it, but the most courageous brewer would not plead this as an excuse for selling the impure article.

In conclusion, I would venture to express the earnest hope that the Congress will not endorse the view that it is inadvisable to take any measures to prevent the transmission of tuberculosis from the lower animals to human beings. To justify the introduction of measures to that end it is not necessary to contend that this is a common method of infection, or that the danger arising from milk can for a moment be compared with that present in human sputum. The inhalation of tubercle bacilli expelled from the bodies of human patients is doubtless the great cause of human tuberculosis, and every practicable means of preventing infection in that way ought to be employed; but, at the same time, we ought not to concede to the milkmen the right to sell us tubercle bacilli, even if we were assured that—like Dr. Koch's experimental pigs—we had nothing to fear beyond the development of "little nodules here and there in the lymphatic glands" of our necks and "a few grey tubercles" in our lungs.

SECTION IV.

THIS Section, which dealt with Tuberculosis in Animals, held its first meeting in the Polytechnic, Regent Street, on Tuesday, July 23rd—Sir George Brown, C.B., the President of the Section, occupying the chair.

He was supported by the leading members of the veterinary profession.

The subject for discussion was "The Diagnosis of Tuberculosis in Animals during Life," and was opened by Professor Dewar, F.R.C.V.S., the Principal of the Royal (Dick) Veterinary College, Edinburgh, who said :—

THE DIAGNOSIS OF TUBERCULOSIS IN ANIMALS DURING LIFE.

BY PROFESSOR DEWAR, F.R.C.V.S., PRINCIPAL OF THE ROYAL VETERINARY COLLEGE, EDINBURGH.

"As time is limited, and as tuberculosis is of greatest importance to the veterinary profession as occurring in the ox, it will be advisable to confine our observations to the diagnosis of the disease in the bovine species.

"Having practised at a time when there was nothing to rely on to assist our diagnosis but the older clinical methods, I am able to appreciate these without failing to estimate at their true value the methods introduced subsequent to the discovery of the causal organism of the disease by Dr. Koch. Previous to that date the seriousness of the affection, its contagious nature, and the extent of its spread amongst the herds of our country, were only suspected by a few. But previous to that date I had already dealt with it as an actively contagious disease.

"As our subject is not semiology but diagnosis, it will be unnecessary to dwell on the primary symptoms of the disease. It is not uncommon for its first appearance to be indicated by a rough harsh sound in the throat during respiration, especially in young animals, and heard best when the head is lowered in feeding. There may be nothing else. Possibly on manipulation an enlargement may be made out in the upper parotid region. The history will assist : the prevalence of tuberculosis in the herd, or of actinomycosis in the district. When a tumour begins to project externally in the same region it can generally be distinguished from actinomycosis. The tubercular tumour becomes adherent to the skin over a single central area as a rule. As often the actinomycotic tumour forms more than one point of adhesion, and subsequently of softening. If enlarged lymphatic glands can be made out about the root of the neck or elsewhere, diagnosis is practically confirmed, while with actinomycosis the jaws, tongue, or lips are more frequently involved.

"But as in about 75 per cent. of cases of tuberculosis the thoracic organs are early affected, it becomes a question of diagnosing the disease within the chest.

"If in a cow—and it is often in a cow—she may be observed to give an occasional cough without anything very characteristic about it. It can often be induced by turning her out of the warm byre into the colder atmosphere outside, or by any excitement or disturbance, but her health is not affected and the owner thinks nothing of it.

"By-and-by, although feeding all right and giving an ordinary amount of milk, she begins to lose condition, the hair becomes dry, and if in the byre she may be found sweating over the shoulders in the mornings. Very often a peculiar facial expression, the outward and visible indication of the tubercular diathesis, becomes apparent to the experienced observer. Before emaciation is at all pronounced the skin becomes firmer, it is less soft, supple, and movable, and more adherent to the subcutaneous tissues. Pinching over the back or loins may cause the animal to cringe, and in the intercostal spaces may be manifestly painful. The cough becomes more frequent, more spasmodic, occurring in fits, and is sometimes

evidently painful. Still most of these symptoms may be present in other diseases —the emaciation, the cough, &c.—although the hide-bound condition is seldom so pronounced, so distinct, at such an early stage as it is in tuberculosis. Amongst these diseases are chronic bronchitis, verminous broncho-pneumonia, and the presence of hydatids in the lungs, contagious pleuro-pneumonia, and foreign bodies passing forwards from the stomach. The two latter should not be difficult to distinguish. Verminous bronchitis usually affects a number of individuals, and the cough, emaciation, and other symptoms are quite different; and the presence of hydatids is indicated by complete dulness or percussion in one or more pulmonary areas. From chronic bronchitis, if accompanied by emaciation, the differential diagnosis is more difficult.

"On percussion there may be little to distinguish them,—in bronchitis there may be no perceptible alteration on percussion, and if accompanied by pulmonary emphysema the resonance may even be increased. But there may be no diminished resonance in pulmonary tuberculosis where miliary tubercles are scattered throughout the lungs, at least in the upper part of the chest the resonance may even be increased, although it is often somewhat diminished; there is some perceptible dulness towards the lower and anterior parts of the chest.

On auscultation the vesicular murmur is heard louder and harsher than normal over the upper half of the chest. Towards the lower borders of the lungs it becomes weaker and may be almost imperceptible towards the middle and anterior regions of the chest, or bronchial sounds may completely disguise it. There may be nothing heard but sibilant rales and sonorous rhonchi, which become displaced or altered on coughing. There can also be observed—what can also be seen while standing watching the animal breathing—a difference in the relative length of the inspiration and expiration. The expiration is prolonged, longer than the inspiration. If there is perfect quietness this can be clearly made out on auscultation. The vesicular murmur is distinctly heard during expiration, and as distinct towards the end of the expiratory act as at the beginning. This never occurs in health, nor am I aware that it occurs in any other disease.

"In chronic bronchitis the vesicular murmur is also louder and harsher than normal, but it can be heard over all the chest, except where it may be nearly disguised by loud abnormal bronchial sounds. But the expiratory movement is shorter than the inspiratory, and on auscultation the respiratory murmur is only heard at the start of the expiratory movement.

"Although the departure from the normal in the relative length of the inspiratory and expiratory movement can be easily seen as a rule, it requires perfect quietness to allow one to be able to appreciate the difference in the respiratory sounds on auscultation. With a large number of cows in a byre, with chains rattling here and there, it is perfectly useless attempting it.

But tuberculosis frequently affects other organs as well as the lungs, and our older clinical methods are often unequal to the formation of a definite diagnosis. The most important of these other organs, from a public health point of view, is undoubtedly the mammary glands. Increased experience leads me to believe that the number of tuberculous cows affected with tubercle of the udder is greater than that usually estimated, *i.e.* about 3 per cent. Apart from cows that are only recognised as tuberculous through the action of tuberculin, I think the percentage would be from five to seven.

"In the udder the progress of the disease is often slow, and there is no doubt but it may exist for weeks in such a condition as to render the milk dangerous before the most expert clinician could detect its presence. The posterior quarters, one or both, are most frequently affected, and although sometimes acute, it is seldom distinctly painful. As a rule the swelling is more or less diffuse, not often nodulated, and the physical characters of the milk are at first very little changed, less so than with a non-specific inflammation or "weed." On the other hand one quarter of the udder or more may become rapidly enlarged, hard, brawny, although but little painful, and it should not be mistaken for a simple inflammatory induration.

"Bacteriological Diagnosis.

"This brings us to bacteriological diagnosis, which is of most general use in the examination of milk, a subject which I cannot enlarge on at this time.

"It can also be applied to discharges from the nose, to matter coughed up, or scraped or sponged off the pharynx while the tongue is secured after causing the animal to cough, to the pus from the suppurating tumours, from cold abscesses, to any suspected discharge from the vulva, and to particles of tissue abstracted from an enlarged mammary gland, lymphatic gland, or even tumour, by the pathological harpoon. The demonstration of the tubercle bacillus under the microscope is distinct evidence of the presence of the disease.

"Dr. Ferran, Director of the Bacteriological Laboratory, Barcelona, has published a statement that the tubercle bacillus possesses the curious property of producing in certain media a substance which emits a peculiar easily recognisable odour, not unlike that of 'human sperm;' that the best medium for this purpose is the serum of the sheep, which has been hyperimmunised by cultures of the bacillus, and that when a little of the medium is shaken up with a drop of the suspected tuberculous matter, and kept at a temperature of 29 to 30° C. for thirty-six hours, if Koch's bacillus is present the characteristic odour is easily recognised. He asserts that this method gives positive and reliable results where the microscope has failed to detect the bacilli. I have not observed any confirmation of this method of diagnosis by other experimenters.

"Of more importance it seems to me is the agglutinating power of tuberculous serums, or even tuberculous effusions. As early as 1898 attention was directed to this method by M. Arlonig, Director of the Veterinary School of Lyons. He seems to consider the method of great importance in diagnosing tuberculosis in the early stages in the human subject.

"Experimenting on cattle he found that the blood serum of healthy adult cattle had an agglutinating power on tubercle bacilli in a 'bouillon' culture, but that the power was only feeble, whereas the agglutinating power of the serum of tuberculous cattle was much more powerful; and he states that in this manner the presence or otherwise of tuberculosis in the animal from which the serum is obtained can be determined. He claims that this method of diagnosis is calculated to be of great usefulness in cases where fraudulent means have been used in order to prevent the usual reaction from tuberculin. This failure to react to the tuberculin test may be brought about by repeated injections of tuberculin, and probably by other means. The agglutination method might therefore prove of great value to portal veterinary inspectors and those interested in preventing the importation of diseased animals.

"At the same time it is not a method which can be readily applied by many practising veterinary surgeons. It requires a considerable familiarity with bacteriological methods, with laboratory technique. It is necessary to have a culture of the tubercle bacilli in which the organisms are uniformly distributed throughout the culture media, so that it has a homogeneous appearance from top to bottom. M. Arlonig states that to a little of this culture in a small test tube a few drops of blood serum from the animal to be tested are added, shaken together, and the tube left upright. He adds that agglutination commences almost at once, that it becomes visible to the naked eye in five or six hours, and is complete in twenty-four hours. The agglutination is characterised by a turbidity in the tubes, the bacilli forming into small clots which soon sink to the bottom of the tubes, leaving an absolutely transparent liquid above, if the agglutination has been complete. The amount of serum required to cause complete agglutination of the bacilli is used to estimate the agglutinative power. Thus if fifteen drops of serum are required to cause complete agglutination in sixty drops of the culture, he says that the serum has an agglutinative power of one in five. He states that this is practically the agglutinative power of the blood serum in healthy adult cattle, while that of calves under two months old is not over one in two, and that of tuberculous cattle is as high as one in ten and even more. Consequently an animal, according to M. Arlonig, the blood serum

of which has an agglutinative power of one in ten and over, should be considered tuberculous.

"As far as the human subject is concerned, this method has been tried by several experimenters, and very varying verdicts given regarding it. In the *British Medical Journal* of May 4th last it is stated that Courmont, after a long series of experiments, mostly with pathological effusions—pleural and ascitic effusions and cerebro-spinal fluid—concludes that 'serum diagnosis, in cases of effusion, is likely to prove of immense value.' That is in the human subject. When the diagnosis may remain doubtful, he recommends that the agglutinating power of the blood ought to be compared with that of the pathological effusion.

"Benaix regards the agglutination of the bacilli as a very favourable method of diagnosis. On the other hand Beck and Rabinowitsch say it is unreliable, whilst Fraenkel considers it of no practical value.

"It will be cause for regret should those pessimistic estimates prove correct, as a supplementary method to those already recognised would be often very useful.

"But the introduction of tuberculin gave us the most efficient, reliable, and practical means we yet possess of diagnosing tuberculosis. At first hailed as a beneficent agent in curing the disease in the human subject, it was soon found that the too sanguine hopes entertained regarding its curative properties—whatever future experience may yet prove these to be—were doomed to disappointment, and it is to-day recognised as being of more value to the veterinary surgeon as a diagnostic agent than for any other purpose.

"Notwithstanding the many attempts to discredit its diagnostic value, and expressions of scepticism when reactions were very numerous; notwithstanding the cases—numerous cases, shall I say?—of repeated failures, published and made much of, mostly in agricultural journals—(how seldom it is that any complaint of failure in its action is seen in a scientific journal!)—notwithstanding the extent to which it has been decried, it is by a long way the most reliable, the most practicable, and the most uniformly useful means of diagnosing nascent or latent tuberculosis that we possess. In fact, we have no other of any practical value, for those methods we have already considered, whatever value they may be found to possess, are as yet scarcely out of the experimenting stage. For the full and successful use of tuberculin as a diagnostic agent several things are required:—

"1. A thoroughly reliable tuberculin. There is no doubt but there are tuberculins and tuberculins, and as tuberculin can have no definite and unalterable chemical composition there is no security for its quality but in having it properly prepared by a competent pathologist or pathological chemist, and carefully tested before being sent out for general use. Then, whether it is in the form of a powder or a solution, whether concentrated or diluted, it ought to be thoroughly safe and reliable in certain stated doses as a test for tuberculosis.

"2. That the herd to be tested should be kept quiet and undisturbed, without any pronounced change in food, in pasturage, in surroundings, in management of any kind, for ten to fifteen days prior to the application of the test. The recurrence of the usual genetic phenomena renders the female, for the time, less fit to undergo the test; and if at large in a field amongst others, she may disturb the result of the test in a considerable number of animals. In our more northern latitudes we have some advantage in the application of the test over those situated farther south. When animals are tied up for the winter there is almost an ideal condition for the application of the test. It is much to be preferred to doing it while they are out at pasture. The length of the winter also enables the test to be applied to a herd twice a year while housed, at practically six months' interval.

"3. That the veterinary surgeon be allowed perfect freedom and every facility in the application of the test. With plenty of willing and intelligent assistants there should be very few mistakes, very few doubtful reactions. There is no doubt but a very prevalent thoughtlessness on the part of owners of stock in disarranging animals or in carelessly introducing some disturbing element is frequently the cause of doubtful results which otherwise would be distinct and reliable.

XUM

"The test being finished, a proper reading and proper understanding of the temperature chart is necessary to a correct allocation of the animals. A normal reaction in a tuberculous animal begins about the ninth or tenth hours, attains its maximum from about the thirteenth to the seventeenth hours, and again gradually falls. Any sharp sudden rise in temperature with sudden fall, or any drop and subsequent rise during the reaction, should be looked on with suspicion. Also any delayed and sudden rise, although I have seen an early sharp rise in very tuberculous animals and the rise delayed in old animals but slightly affected, still cases would require to be multiplied before these could be considered of diagnostic significance. Then what rise of temperature should be considered as diagnostic of tuberculosis? First let me deprecate the fixing of any definite temperature the rising above which should be considered sufficient to condemn the animal. This has been done in printed instructions sent out with tuberculin. The reaction should only be considered as the extent of the rise above the normal temperature, and that should be ascertained by taking it repeatedly, finding it practically steady, and taking the mean. A variation of 1½ degrees F. will often be found in animals in perfect health, and while 101 degrees may be normal in one animal, it may be 102½ degrees in another.

"When I first commenced to use tuberculin any animal giving a reaction of 2½ degrees F. or over was condemned, any one in which the reaction was not over 1½ degrees was considered healthy, while those in the intermediate zone were classed as doubtful.

"Now although nineteen out of every twenty tuberculous animals will give a reaction of over 2½ degrees F. under favourable circumstances with reliable tuberculin—and in nineteen out of every twenty healthy animals the temperature will not rise over 1½ degrees F.—yet increased experience leads me to believe that most of those animals giving a reaction over 2 degrees F., and formerly classed as doubtful, ought to be considered tuberculous.

"Another thing which tends to cast discredit on the tuberculin test is the attempts that are made, sometimes countenanced in high places, to test animals on the cheap. The temperatures are never taken until the tuberculin is about to be injected, and only at the 12th, 15th, and 18th hours, and the investigator goes away with his chart satisfied that he has done his duty. In all cases it ought to be taken at the 9th hour and on to the 18th. In some cases useful evidence may be obtained an hour or two later. Then as the taking of the temperatures even every three hours usually requires the continuous attendance of an assistant, they should be taken every two hours unless the herd is a very large one where a host of assistants would be required.

"By attending to this the thermic curve obtained is more continuous and more satisfactory than when short, abrupt, and stilted.

"I wish again to emphasise the fact that a willing faith, an intelligent belief, in the reliability of the test, and in the contagious nature of the disease on the part of the owner, is a very important factor in its application, and in the ridding of a herd of this terrible scourge. Of course occasional doubtful reactions will occur, but on re-testing a month later most of these will give some distinct indication.

"When every precaution is taken and the test carefully applied, at least 98 per cent. of the results will be correct and definite. It is almost as was stated in the summing up of a Report by the Veterinary Inspector to the Board of Public Health of Victoria two years ago. After testing 297 dairy cows he said: 'When tuberculin indicated that tuberculosis was present, tuberculosis was found; and when tuberculin indicated that tuberculosis was not present, tuberculosis was not found.' None of our methods are so perfect but that they are capable of improvement."

The discussion on Professor Dewar's paper was opened by Professor E. M. Nocard, of Alfort, who spoke in French. The conclusions he came to were that tuberculosis is one of the diseases of cattle which causes most loss to agriculture in all countries. Everywhere, he affirmed, the disease is on

the increase; everywhere it forms a menacing danger to public health as well as to public wealth. Infection being the only formidable cause of the increase of tuberculosis, there is need for the adoption of legal measures prescribing—(1.) The complete separation of unhealthy from healthy animals; (2.) The slaughtering, without delay, of those sick animals which show clinical signs of the disease, and especially of cows attacked with tuberculous mastitis; (3.) The interdiction from selling other tuberculous animals for a destination other than the slaughter-house; (4.) The pasteurisation of all the sub-products used in butter and cheese manufactories.

Professor BANG, of Denmark, followed. He recommended the tuberculin test very warmly, and agreed with the opinions expressed by Professor Dewar and Professor Nocard.

Dr. MALM, the Director of the Veterinary Service of Norway, considered that the tuberculin employed for diagnosis should be a tuberculin produced on the same principles as that of Koch in 1890. Its strength should be uniform, and it should be of such toxical strength as to kill with certainty six to eight weeks' old tuberculous guinea-pigs within eight hours, in doses of 20 to 30 centigrammes subcutaneously. Such a tuberculin produced unfailingly in tuberculous animals a febrile reaction of a distinct type. He recommended that large doses should be given, even to young animals; and in his opinion there is no danger or inconvenience in always employing doses of a half to one gramme. Tuberculin at times might also produce fever in non-tuberculous animals, but the fever is not typical, and did not attain such a degree as in tuberculous cases. If a typical tuberculous reaction appears in an apparently healthy animal, and on dissection nothing tuberculous was found, it was the fault of the dissector. To determine with certainty whether reaction exists or not, it was necessary to take the temperature from the sixth to the twentieth hour after injecting, hourly, or at least every second hour. The fact that tuberculin in a few isolated instances produces fever in non-tuberculous animals, he considered of no importance when the question was its usefulness as a means to eradicate tuberculosis, for in this respect it was decisive, as tuberculin invariably caused reaction in tuberculous animals.

Mr. WILLIAM READ, of the London Central Meat Market, asked whether it was possible, even for a professor, to detect tuberculosis in an animal before emaciation had set in by simply looking at it in a yard, field, or market?

Professor SCHÜTZ, of Berlin, who spoke in German, was understood to say that it was possible to make a diagnosis of tuberculosis of the udder by examination of the milk; but this statement was controverted by Dr. Bang.

Professor M'FADYEAN said there were very few points in Professor Dewar's paper with which he was not in agreement. To deal successfully with tuberculosis, it was necessary to make an early diagnosis, and he thought every one would admit there was no other method than the tuberculin test by which one could in 80 per cent. of the cases of tuberculosis in existence at any given moment arrive at any conclusion at all. He thought one was not justified in saying that every animal with tuberculosis would give a distinct reaction when tested with tuberculin; and mentioned that in a certain proportion of cases animals which had been tested and gave no reaction were found on slaughtering to be tuberculous. There was every reason to believe that in practice the interval which elapsed between the actual moment of the entrance of the tubercle bacilli into the body and the

earliest moment at which a reaction was obtained was sometimes considerable; and that he regarded as a distinct defect in tuberculin which had to be reckoned with.

Professor W. O. WILLIAMS feared that if the paper was published without some explanation it might lead the public into thinking that the ox tribe was the only tribe from which the human being had to fear any danger, and pointed out that the horse, dog, cat, and bird very often conveyed the disease. He spoke of the importance in diagnosis of taking the temperatures night and morning. Animals having tuberculosis, when subjected to the tuberculin test, would show continuous variations in temperature both at morning and night. He was a believer in the infallibility of tuberculin, and he had never yet known it to fail in giving a correct diagnosis.

Mr. POTTIE, of Paisley, thought that a veterinary surgeon who knew his duty, and could detect tuberculosis in cattle, would succeed better in practice without the use of tuberculin.

Professor W. EDGAR maintained that it was the great business of the veterinary surgeons present at the Congress to say both to the Government and to the British public that they were now well able to diagnose tuberculosis. His convictions were as strong as those of Professor Dewar as to the accuracy and value of tuberculin, and, in his opinion, the amount of liability to error depended upon the amount of care expended in the work. If people required their herds to be tested cheaply, an element of error was at once introduced. He contended that if any error was made it should be made against the cow and the owner of the cow, in the interest of the public, if life and health were concerned. He also maintained that a practical veterinary surgeon, as the guardian of the public health, should require that the milk of a cow that reacted to the test should not be sold to the public.

Mr. W. FIELD, M.P., considered that the question asked by Mr. Read was the kernel of the whole matter.

Professor M'EACHRAN, of Montreal, said that in his experience, which was somewhat extensive, in Canada tuberculin could be relied upon almost exclusively. Out of some 18,000 animals tested last year, post-mortems showed that not 2 per cent. of errors had taken place. In his experience udder infection was not very common, but uterine infection was much more so than was generally supposed, and was one of the dangerous contagious diseases which should be always looked for by inspectors. When it was found that foreign countries and colonies were determined that no cattle should be introduced into their countries without having been tested with the tuberculin test, it showed that the breeders of thorough-bred stock in England must adopt that test, or the probabilities would be that they would lose a very valuable market.

Mr. S. VILLAR pointed out that the rustling noise in the throat made by an animal when eating, mentioned by Professor Dewar, might also arise in a perfectly normal animal, due to deposits of fat round the glands of the throat. He considered the use of tuberculin of the utmost value to agriculturists, especially to exporters of cattle, because by simply injecting a young animal, certain knowledge was obtained as to whether the abnormal sound in the throat was due to tuberculosis or to a deformity.

Mr. LAITHWOOD, Chief Veterinary Inspector of the county of Cheshire, said that in the majority of cases he had been unable to diagnose the

disease without the help of tuberculin; he had tested over 4000 animals and had found very few mistakes to occur. Where the animals had been slaughtered the test had been corroborated in 96 per cent. of cases. He had found that about 3 per cent. of reactions had the highest temperature ten hours after injection, 80 from the twelfth to the fourteenth hour, 12½ from the fourteenth to the sixteenth hour, and 3½ from the sixteenth to the twentieth hour. He was firmly of the belief that there was nothing of such immense value in the diagnosis of tuberculosis than thoroughly reliable tuberculin properly injected, and with the temperatures carefully taken from the ninth to the twentieth hour after injection.

Mr. T. EATON JONES, of the Liverpool Corporation, said that in Liverpool every confidence was reposed in tuberculin, and he believed it to be infallible. Only on one occasion did he find a cow which had been tested give less milk, and he did not think the animal lost flesh; and his remarks were corroborated by Councillor RAMSDEN.

Mr. J. S. LLOYD, of Sheffield, spoke of the difficulty of diagnosing the disease in the udder at an early stage of the disease.

Mr. C. E. PEARSON, who spoke on behalf of the National Federation of Meat Traders, thought that if tuberculin was prepared by a competent pathological chemist, and it was necessary, as Professor Dewar appeared to think, to have it afterwards tested, its value was reduced. Butchers were not altogether satisfied with tuberculin as a reliable agent, because in some cases where it had been used beasts had reacted when not suffering from tuberculosis. The butchers gave place to no one in their desire that the awful scourge of tuberculosis should be eradicated from mankind. Had the medical officers of the country and the inspectors acted up to the Report of the Royal Commission, the butchers of the present day would not have to take such an active part in the question.

Mr. WILLIAM FIELD, M.P., said the question he desired Professor Dewar to answer was, whether it was possible by inspection to diagnose and certify the disease of tuberculosis in the living animal without having recourse to the tuberculin test. It was a burning question in the meat trade, because butchers were obliged to buy the animals in open market, and afterwards the beasts might be confiscated and the trade had to bear the loss. The trade was now being thrown into the hands of the foreigners.

Professor DEWAR, in replying upon the discussion, said it had not been claimed that tuberculin had any immunising power on an animal, that was to say, an animal was as likely to contract tuberculosis when it had been subjected to the tuberculin test as it was before. There was not the least doubt there must be some short incubative period, and if an animal was free from the disease at the time the test was applied it might be taken that it would be some weeks before it would react to the test again, and in that case it might be held to be perfectly free from tuberculosis. Answering Mr. Read's question, he thought he might say, for himself and his colleagues who were designed by the name of professors, that they did not claim there was any divinity hedging a professor as far as the diagnosis of tuberculosis was concerned; and, answering the question plainly, as a rule it would be impossible. Even supposing it were possible, the probability was that a veterinary surgeon, whether a professor or not, if he were as cautious as Scotchmen were usually credited with being, would tell his client that the probability was that the animal was infected. He certainly did not claim that tuberculin was an infallible test for tuberculosis, but

there was nothing altogether infallible in this sublunary sphere, and he considered it was as nearly an infallible test as anything that was likely to be obtained. He agreed it would be desirable that the Government should make itself responsible for the tuberculin, and it would be also desirable that its distribution should be undertaken by the Government.

The Section then adjourned.

On Wednesday, Sir George Brown, C.B., presided over the meeting at the Polytechnic, when Mr. J. A. W. Dollar, M.R.C.V.S., read a paper on "Tuberculosis and the Milk Supply."

In opening the proceedings the Chairman spoke of the statement made by Dr. Koch that human tuberculosis was not communicable to the cow, and that consequently bovine tuberculosis could not be communicated to man. If that statement were accepted, a large number of people concerned in the cattle, meat, and milk trades might rush to the conclusion that all restrictions hitherto imposed upon them would be at once removed; but he might tell them that anything so utterly rash would not be attempted. Many celebrated men had made experiments, and they held other views than those of Dr. Koch, and the best advice to give at the present time was "don't rush." The matter was of tremendous importance, and the announcement of Dr. Koch's discovery was more startling than his discovery of tubercle bacillus. It was best to wait further developments.

Mr. DOLLAR then read his paper, and remarked that for Dr. Koch to say, after experiments which extended over a few months only, that those who had formed opinions from a host of investigations made in all parts of Europe during twenty-five years, should now set those opinions aside, was to make too great a request. He did not think Dr. Koch was well advised to make the remarks he did, which undoubtedly would have a serious effect on legislation, which was about to arrive at maturity, and upon which both the veterinary and medical professions would continue to lay the highest importance. For his own part, he adhered to the terms of his paper, which was written some time ago.

TUBERCULOSIS AND THE MILK SUPPLY.

BY JNO. A. W. DOLLAR, M.R.C.V.S.

"The essential identity of human and bovine tuberculosis, indeed of tuberculosis in all mammals, was experimentally demonstrated long before the discovery of Koch's bacillus.

"Villemin and many other experimenters early showed that the infection was of the same type, and that its lesions were identical whether the material for inoculation were derived from man or from the ox. Chauveau, Klebs, Bollinger, Crookshank, and many others, transmitted the disease from man to the ox.

"The later discovery of Koch's bacillus and its constant presence in the specific lesions in all animals clearly proved the practical identity of tuberculosis in all mammals.[1]

"The transmissibility of tuberculosis from animals to man necessarily may not be made the subject of experiment, but reported cases exist which have

[1] Chauveau, "Identité de la tuberculose de l'homme et de la tuberculose des bovides, des gallinacés et autres animaux," 'Report of Second Congress on Tuberculosis,' 1891, p. 51. Nocard, "Sur l'identité des tuberculoses de l'homme, du cheval et du porc.," *idem*, p. 137.

almost the force of experiments. The best known perhaps is Ollivier's. Thirteen girl scholars in the pension of the Dames Blanches, at Chartres, though born of healthy parents and always previously enjoying good health, became ill after for some time drinking milk from a cow which, on slaughter, showed well-marked tuberculosis of the udder. Five died.

"Similar though perhaps less striking cases have been reported by Johne, Hermsdorf, Leonhardt, Sonntag Stang, Schuppenhauer, and Demme. Mazyck P. Revenel, of the Sanitary Board of Pennsylvania, described before the Philadelphia Pathological Society in June 1900 five cases of tuberculosis of the skin in man, produced by direct accidental inoculation with bovine tubercle bacilli. In four cases the victims were veterinary surgeons.

"The transmissibility of bovine tuberculosis to man, and the constant presence of tubercle bacilli in milk from cows with clinical tuberculous lesions of the udder, being conceded, several highly important problems immediately arise, the solution or partial solution of which we are here assembled to attempt. Very briefly they are as follows:

"In what degree is the milk of tuberculous cows dangerous to the consumer? Next, what is the proportion of cows in this country infected with tuberculosis, and especially with tuberculosis of the udder? Lastly, what measures are called for to guard the public against the spread of tuberculosis through the medium of milk?

"To revert to the first question: It is at once fairly obvious that milk containing tubercle bacilli has only a relative infectivity for adults. The results of careful investigation show that a certain proportion of all samples of milk commercially retailed contain tubercle bacilli, and the same conclusion is logically deducible.

"Obermüller[1] found among 13 samples of commercial milk from a large Berlin establishment 8 infected. The results were confirmed by Lydia Rabinowitsch.[2] Jäger[3] tested 100 consecutive samples of milk delivered to a hospital in Könisberg, and found tubercle bacilli in 7. Petri examined 102 samples of butter and found tubercle bacilli in 17.

"Bollinger[4] found 16·6 per cent. of samples of commercial milk in Munich contained tubercle bacilli; Martin in Paris found 33 per cent.; Bang in Copenhagen 15·5 per cent.; Obermüller in Berlin 7·5 per cent.; Fiorentini in Milan 10 per cent.; Peters in Boston 33 per cent.; the Paris Municipal Laboratory 40 per cent.; Hamilton, Boyce, Woodhead, and Delépine in Liverpool 29 per cent.; and Delépine alone at Manchester 25 per cent.

"Given that a proportion of all milch cows suffer from tuberculosis of the udder, it is clear that in the mixed milk of large dairies some samples must necessarily be infected, and that the larger the number of cows contributing to a common sample the greater the probability of that sample containing the specific bacillus. On the other hand, if a certain concentration of the bacilli is necessary for infection, the admixture of milk from many cows may in itself prove a factor of safety, the proportion being lowered by dilution with normal milk. At the same time such dilution implies risk to a larger circle of consumers. Knuth, of Berlin, who carried out a long series of experiments, administered virulent milk of constant composition to guinea-pigs in doses varying from one twentieth of a gramme up to 300 grammes. He found the animals which received less than 15 grammes remained healthy, while all those which received more became tuberculous. Similar results have been obtained by Ostertag.

"In connection with the transmission of tuberculosis by milk the rarity of primary tuberculosis of the bowel in human beings is somewhat singular. By this I do not mean to suggest that the specific lesion should necessarily always be

[1] Obermüller, "Uber Tuberkelbacillenbefunde in der Marktmilch," 'Hyg. Rundschau,' 1895, v., No. 19.

[2] "Beitrag zur Frage der Infektiosität der Milch tuberkulöser Kube," 'Zeitschr. f. Hygiene und Infektionsk.,' xxxi., 1899, p. 137.

[3] "Uber die Möglichkeit tuberkulöser Infektion des Lymphsystems durch Milch und Milchprodukte," 'Hyg. Rundschau,' 1899, No. 16.

[4] 'Les maladies microbiennes des Animaux,' 1898, p. 652.

sought at the point of entry of the organism—the feeding experiments with glanders bacilli made by Professor Nocard on the horse sufficiently disprove such a hypothesis—but the results of a careful search for reported cases of primary bowel tuberculosis in man are so curious that I consider them worth noting. Among German authorities Schwer, who conducted 123 very thorough post-mortem examinations on children with intestinal tuberculosis, only found 10 cases of primary disease.

"Boltz[1] found 11 cases of primary disease after 176 post-mortems on children with intestinal tuberculosis. Grawitz,[2] between 1876 and 1880, only found 10 cases of primary tuberculosis of the peritoneum among all the cases occurring in the great Charité Hospital in Berlin, but saw 202 secondary cases. Biedert's[3] *resumé* of 3104 post-mortems on tuberculous children only contains 16 unquestionable cases of primary tuberculosis of the bowel. And yet these figures, small as they are, seem enormous when compared with the unquestionable cases of primary bowel tuberculosis in adults. Behrens,[4] a very capable authority, gave a critical survey of all the recorded cases in German literature up to the year 1894. They were two in number, that of Wyss and that of von Eisenhardt. A few others have since been published, but they are extremely limited in number. On the other hand, many cases of intestinal tuberculosis in children occur in which it is impossible to demonstrate whether the bowel lesion is primary or secondary, so that the actual proportion is probably greater than that observed.

"Bearing in mind, then, that a considerable proportion of commercial milk contains tubercle bacilli, that milk is largely consumed in a raw state, that in the cases where infection has been directly traced to the consumption of tuberculous milk, such milk has almost invariably been derived from a single cow suffering from tuberculosis of the udder, and therefore delivering milk of an exceptionally dangerous description; bearing in mind all these facts, I say, and the further facts that whilst during the past fifty years tuberculosis in English cattle has shown an alarmingly rapid increase, human tuberculosis in adults has diminished by 45 per cent., I venture to suggest that for normal adults the danger is very much less than might at first appear.

"On the other hand, the danger to infants and to debilitated persons, or those recovering from illness, is probably very great, the more so as the risk is often repeated. Since 1850 the mortality from abdominal tuberculosis in children less than one year old has increased by 27 per cent. Of 1,000,000 children born, 4278 male and 3454 female children die of tuberculosis (particularly in the form of tabes mesenterica) during the first year.[5] The majority of deaths occur between three and six months of age. Though still high in the second year, the mortality is less than one-half that of the first year, and from then sinks rapidly. Professor Heubner found that of 800 healthy three-months-old children 26 per cent. had become tuberculous by the end of the first year. He thinks infection often occurs by inspiration of infective material, but that the nourishment, which is largely cow's milk, also plays an important part.

"*Distribution of Tuberculosis in Cattle.*—Mr. C. Hunting, who examined 4000 English cattle, found 20 per cent. tuberculous. Comparatively recent official figures show a proportion of 18·7 per cent. in Durham, 20 per cent. in Midlothian, 22·8 per cent. in Yorkshire, 25 per cent. in the dairies in London, and 40 per cent. in those in Edinburgh.

"In Denmark, of 158,991 oxen tested with tuberculin, 48,955=31 per cent. reacted.

"In Sweden, of 35,922 tested 15,203=42 per cent. reacted.

"In Norway, of 30,787 tested 2589=8·4 per cent. reacted.

[1] Boltz, "Ein Beitrag zur Statistik und Anatomie der Tuberkulose in Kindesalter. In Diss., Kiel, 1890.

[2] Grawitz, 'Charité-Annalen,' 1886, xi., p. 785.

[3] Biedert, "Die Tuberkulose des Darms und des lymphatischen Apparates," 'Jahrbuch für Kinderheilkunde,' xxi., p. 158.

[4] Behrens "Uber primäre Tuberkulöse Darminfection beim Menschen," in Diss., Berlin, 1894.

[5] *Lancet*, 1899, April 22nd.

"In Belgium 60 per cent. reacted.

"In Italy the figures vary between 7·5 per cent. in the Roman abattoirs and 30 per cent. in Lombardy (Fiorentini).

"In Massachusetts, U.S.A., during 1897 58·9 per cent. of the cases reacted.

"In New Zealand Mr. Gilruth, chief of the Veterinary Department, stated so long ago as 1897 that 50 per cent. of the older breeding cattle were infected. As these animals are rarely housed he considers the disease is chiefly spread by ingestion. The Report for 1898 of the Chief Inspector of Stock for Queensland shows that from 2½ to 9 per cent. of the carcases of cattle there slaughtered were *condemned* for tuberculosis. Mr. A. W. Barnes, M.R.C.S., who for twelve years acted as inspector of the largest meat works in Queensland, states having frequently condemned from 15 to 20 per cent., and in one instance as many as 75 per cent.

"In Germany the figures vary between 37 per cent. and 97 per cent., depending on locality. Röckl found 20 per cent. of all slaughtered oxen tuberculous. Cows are probably more frequently affected.

"The reports of the Prussian slaughter-houses for 1899 showed 16 per cent. of all slaughtered cattle tuberculous. In Berlin during the same year 153,437 animals were slaughtered, and 30,167 = 19·87 per cent. found tuberculous.

"When, however, we take the case of *cows alone* the figures become much higher. Of 48,172 cows slaughtered in Saxony during 1899 over 35 per cent. were tuberculous. The older the animals the higher the figures. Thus, of 14,684 cows over four years old, slaughtered in Berlin, 14,556, or 99 per cent. were tuberculous. The lesions, of course, were in some cases trifling, only the bronchial glands being affected. These figures, however, are founded on macroscopic examination in slaughter-houses. On the basis of the tuberculin test the proportion would in general be much larger. Siedamgrotzky placed the proportion for several large establishments in Saxony at 79 per cent., and Eber, reviewing an extensive series of reports, at 78·2 per cent.

"Of these, however, a very small proportion suffer from tuberculosis of the udder. Lungwitz only found 119 tuberculous udders among 17,202 slaughtered animals, *i.e.* ·7 per cent. But only a proportion of these were cows.

"In Saxony, of 16,000 cows recognised as tuberculous, on slaughter in 1897 only 230, or about 1·4 per cent., had tuberculous udders. During the previous five years the figures had been 1·2, 1·5, 1·7, 1·2, and 1·1. The figures for Prussia and Denmark are practically the same.

Professor Stockmann, on the basis of 300 examinations, places the proportion of town-kept milch cows infected with tuberculosis of the udder at from 1·8 to 2·1 per cent. Messrs. Young and Walker, of Aberdeen University, examined 77 milch cows and found about 10 per cent. suffering from tuberculosis of the udder. The results of the London County Council's examination would seem to indicate that about ½ per cent. of London cows suffer from tuberculosis of the udder.

"Professor Ostertag believes that in generalised tuberculosis the udder is diseased in from 5 to 10 per cent. of cases. Rieck places the figure as high as 17·6 per cent.

"The common use of goat's milk as a diet for young children demands the exposure of the dangerous fallacy that goats are immune against tuberculosis. Eichhorn states that his attention was called to a herd of 28 goats, in which one had died of advanced tuberculosis. He then tested the remainder with tuberculin. Nineteen showed a reaction of more than 1° C. Two of these were slaughtered and found tuberculous. Siegen found 10 cases of tuberculosis among goats at one of the Luxembourg slaughter-houses. Cadiot, Gilbert, and Roger,[1] have shown the goat enjoys no immunity against the disease. The use of goat's milk must therefore be subject to the same precautions as that of cows.

"Sheep are much more resistant than cows, but asses, also used as a source of milk, are susceptible to tuberculosis (Stockmann).

"*Methods of Prevention.*—The surest and easiest method of ensuring against milk-borne tuberculosis is for the consumer to boil all milk before use. This, however, presupposes a degree of care on the part of the public which experience

[1] 'Clinical Veterinary Medicine and Surgery,' Cadiot and Dollar, pp. 575-8.

has hitherto failed to indicate. The education of the public must certainly be placed in the forefront of any system of preventing tuberculosis. Short of this, several methods present themselves, viz. sterilisation or pasteurisation of all milk, eradication of tuberculosis from all herds of milch cows, or a combination of such methods.

"Although pasteurisation or sterilisation of all milk would economically prove very difficult, partly on account of increased expense, but chiefly because of the objection of adults to the taste of boiled milk, it is certainly not impossible, as is shown by the example of the 'Pasteur' Milk Establishment in Copenhagen, where the milk is heated to 85° C., cooled without contact with air, and retailed at ordinary prices in microbe-proof vessels to the extent of 7000 gallons per day. The entire staff of the dairy is under medical control. Should any one in the family of any employé be taken ill that employé is suspended (on full pay) until the illness ceases. Similar businesses have been instituted in Amsterdam and Strasburg.

Dresden and Leipzig both possess State dairies, which sell milk pasteurised by Soxhlet's process at very reduced rates, and several of the large London dairies retail sterilised milk, though at considerably enhanced prices.

"According to recent reports, milk heated to 110° C. with agitation, and under strong pressure, suffers no change in flavour, and is of course rendered perfectly sterile.

"If commercially successful, this method would appear to solve the whole problem. A company has been formed to work it in this country.

"The eradication of tuberculosis from herds is perhaps only one degree less difficult than its eradication from the human race. But private enterprise has stepped in where the State feared to tread, and in isolated cases at least has proved successful. The firm of Busck in Copenhagen submits its dairies to constant veterinary control, places its employés under medical inspection, removes all infected cows, and takes the utmost precautions in regard to cleanliness in milking and in storing and distributing the milk. Several of our London dairies advertise milk from special herds proved free of tuberculosis, though I am not aware whether such stringent precautions in regard to employés are observed as are above indicated. But here again the apathy of the British public defeats the best of intentions, and the general verdict of producers appears to be that the comparatively trifling demand for guaranteed pure milk does not justify the extra expense involved in its production.

"The provision of a safe national milk supply is intimately linked with that of the eradication of tuberculosis from herds of milch cattle. It therefore calls for regular supervision of all herds of milch cattle by veterinary surgeons, removal and slaughter of all cows with tuberculous udders, segregation of all cows reacting to tuberculin, and sterilisation or pasteurisation of their milk, the prompt separation of calves from tuberculous mothers after the first day, and their feeding on sterilised milk, the separation of calves from cows in large establishments, and the classification of animals according to age, it being well known that the extent and frequency of the disease tends to increase as age advances. Furthermore, it demands the provision of ample housing space, good light, good ventilation, pure and ample water supply, sound fodder and exercise (if possible at grass), all of which tend to improve general health, and thus to increase the natural powers of resistance to the disease. Floors and mangers should be of impermeable material, common drinking troughs should be suppressed, and although tuberculosis is rarely congenital, the healthiest stock should be selected for breeding, and in-and-in breeding be avoided.

"Even these measures, however, seem insufficient to stamp out tuberculosis entirely. In Belgium, Canada, and the United States, especially in Massachusetts, attempts have been made to eradicate tuberculosis by the use of tuberculin, but have not proved altogether encouraging, and have therefore been suspended. In New Zealand again, cattle which have never been housed, which live in an ideal climate, and are practically in a state of nature, have been shown by Mr. Gilruth to suffer from tuberculosis to a very large extent. Probably the most complete

and sweeping legislation for the conduct of the milk trade is that proposed by the German Milk Trade Union (Das Deutsche Milchwirthschaftlichen Verein), and although the scheme will not meet with universal approbation, it is at least worthy of discussion as showing the position adopted by enlightened members of the trade principally interested.

"The scope of the proposed law is chiefly confined to cows with generalised tuberculosis or udder disease. The introduction of tuberculous cows into the German empire is to be forbidden. The draft law proposes that every milk establishment should be inspected by an expert veterinary surgeon at intervals of not more than three months, and that the milk of every cow which after clinical examination and testing with tuberculin is suspected of tuberculosis should be microscopically tested by the expert, and if necessary further tested by inoculation experiments. Control samples are to be taken for the purpose of appeal if required. An appeal lies to the Imperial Health Office or other competent authority to be afterwards appointed.

"Owners may not part with animals suspected of generalised tuberculosis or tuberculosis of the udder, except for slaughter. Such animals must at once be segregated, and their milk only sold after heating to 85 degrees C. These restrictions cease immediately should an appeal, made to the Imperial Health Office or other appointed authority, be decided in favour of the owner.

"Every cow whose milk is condemned by the Imperial Health Office is to be valued as a milch cow and at once slaughtered under police supervision.

"The difference between the value of the animal as a milch cow and as meat is to be defrayed out of imperial funds. No compensation of less than fifty shillings or more than £15 will be awarded. The value as a milch cow might be based on the yield of milk at the time of condemnation. Penalties for offences against this law are proposed.

"The above recommendations fall somewhat short of those adopted by the International Veterinary Congress at Baden-Baden, which were as follows:

"1. Milch cows, goats, &c. should be placed under regular and periodical veterinary inspection.

"2. The sale of milk from tuberculous animals for human use should be forbidden when the animal is wasted or shows tuberculosis of the udder.

"3. Wasted animals or those with tuberculosis of the udder should be removed and slaughtered in accordance with the methods adopted in Denmark and Sweden, the owner being compensated.

"Owing, however, to the extreme frequency of tuberculosis the former less sweeping proposals would probably receive more support. They aim at first removing cows which yield infectious milk, and for this purpose detection of the bacilli in the milk is necessary. Fragments might also be removed from suspected udders by the use of the 'harpoon,' and examined clinically and microscopically. The finding of the first expert would, if challenged, be controlled by the verdict of the Imperial Health Department. As certain 'acid-fast' bacilli which stain like those of tubercle have been identified by Obermüller, Rabinowitsch, Petri, and others, it might in cases be desirable to make inoculation experiments as well as microscopical examinations. At present, however, the point is of secondary importance.

"Any law of this kind must necessarily be uniform and compulsory throughout the country. Our present permissive style of legislation has proved worse than useless in regard to other matters like meat inspection, and has left England far behind other European nations."

Mr. BOWEN JONES, in opening the discussion, said if Dr. Koch's statement was true, then any legislation of a reprehensive character to prevent tuberculous milk or meat being sold to the public would be absolutely unnecessary, and they might just as well let the matter take its course. He had grave doubts as to the point raised by Dr. Koch, and his advice was that they should continue in the same groove by doing their best to protect

the public from this insidious disease. If any loss were incurred by farmers and others through the compulsory slaughter of their cattle, then he maintained that it ought to be borne by the public purse. He had carefully considered the whole subject, and now moved the following resolutions:—

(1.) "That this Congress is also of opinion that general legislation on the subject of the inspection of dairies is urgently required, whereby uniform regulations with regard to the sale of milk shall be enforced by the Local Authorities, subject to the control of the Local Government Board or the Board of Agriculture.

(2.) "That the expression 'Local Authorities' should comprise County Councils as well as the existing Local Authorities; (*a*) that there should be periodical inspections of all dairies and cowsheds by Local Authorities, by means of qualified inspectors within their respective districts; (*b*) that notification by the owner of every disease of the udder should be compulsory; (*c*) that upon a medical officer of health or other inspector of a Local Authority issuing a certificate of the existence of any disease of the udder, milk from the affected animals shall not be used for human food until a qualified expert shall certify that such milk is suitable for that purpose; (*d*) that upon a medical officer of health or other inspector of a Local Authority issuing a certificate of the existence of tuberculous disease of the udder, such certificate shall be supported by the certificate of a veterinary inspector of the Board of Agriculture or of a veterinary surgeon; (*e*) that as soon as practicable after such certificates are issued the medical officer of health or the inspector of the Local Authority shall bring the case before a justice, who, on being satisfied of the existence of the disease, shall order the slaughter of the affected animal or animals, and shall direct full compensation to be given to the owner thereof, provided the disease is of recent origin; (*f*) that all compensation shall be charged against and paid from imperial funds."

The CHAIRMAN said the resolutions should be brought before the general meeting on Friday.

Mr. M'LAUCHLAN YOUNG was of opinion that the authorities were very lax in the inspection of milk, whereas they were too wide awake as to meat. The tuberculin test was of very great service, particularly in regard to the milk supply.

Mr. JAMES LAITHWOOD (Cheshire) commented on the fact that lawmakers of other countries continued to make regulations to control the disease, while those responsible in Great Britain did nothing but stand by and watch the pitiable and lingering yearly deaths of over 70,000 of its population. A State veterinary service ought to be established which could exercise functions co-ordinate with those of the medical officer of health; to the detection of the disease by the aid of tuberculin and to the payment by the public.

Professor STOCKMAN said if tuberculin was made the only test for tuberculosis impossible sums of money would have to be paid, because it could not be expected that the owners of cows would bear the expense.

Professor OWEN WILLIAMS said, undoubtedly cows were the centre of

the infection, consequently cows ought to be attacked in the first instance, so as to get rid of the disease.

Mr. MONTEFIORE LEVI (Brussels) suggested that the breeding of goats should be cultivated more, inasmuch as experiments had shown that it was almost impossible to inoculate them with tuberculosis. They were easy to rear, they gave good milk, and plenty of it, while the flesh was very palatable.

Mr. MARTIN urged that the sale of tuberculin should be kept out of the hands of unscrupulous people.

Professor AXE, of the Dairy Farmers' Association, said that body were entirely of opinion that tuberculosis was contagious, and until he had heard the startling statement of Dr. Koch he had believed it was communicable from animals to man. He agreed with Dr. Koch making his statement directly he made his discovery, inasmuch as it would draw the careful attention of this and other countries to the subject, and cause the energies of the medical and veterinary professions to be brought to bear upon it. He (Professor Axe) thought that outdoor life should be more studied in the bringing-up of cattle.

Professor BANG (Denmark) explained the laws in vogue in his country, and agreed that outdoor life was much safer for the stock.

Mr. EASTON agreed with Dr. Koch.

Professor M'FADYEAN said Dr. Koch had not actually said that tuberculosis was not communicable to man. What he said was that the important question whether man was susceptible to bovine tuberculosis was not yet absolutely decided, and would not admit of absolute decision to-day or to-morrow.

Mr. CROWHURST and Professor DEWAR (of Edinburgh) also spoke. Professor Dewar said he was of opinion that a great deal of trouble would be got rid of if the cattle were given pure water instead of being allowed to drink any kind of filth which they could pick up.

Professor CRUIKSHANK said he had made many experiments, which he had reported to the Board of Agriculture, and the conclusions which he first arrived at he still held, notwithstanding what had been said by Dr. Koch, some of whose conclusions, he could not help thinking, must be based upon a somewhat hasty generalisation. No doubt there had been a good deal of exaggeration on both sides, and the wisest thing to do would be to adopt a middle course, which would be the one upon which most reliance could be placed. They could engraft upon cows and calves human tuberculosis, and therefore they must not come to conclusions upon results which might go to prove a negative. Therefore the position he took was, "There may be danger, and therefore they ought to act accordingly." So long as the little word "may" was attached to that sentence he hoped the profession would refrain from hindering sanitary progress by relaxing their efforts to obtain pure milk and healthy meat. (Hear, hear, and applause.)

Mr. CARTER and Mr. E. H. GODFREY (Secretary to the Central Chamber of Agriculture) also spoke.

Mr. M'WEENEY referred to tests which he had made, and said that in connection with a certain herd of eighty-eight milch cows which had been kept under the most approved hygienic conditions, excellent results had been obtained.

Mr. DOLLAR then replied on the discussion. He contended that goats were not immuned from tuberculosis. With regard to the death of human

beings from that disease, he gave an instance in which certain of the French population were attacked. In some parts of that country during the winter months many people were in the habit of sleeping in lofts close to the cows, or in the sheds in which they actually were, and it was found that from three to four times as many of that class of persons died from tuberculosis in proportion to the rest of the population. He was sure that the majority of people were satisfied that tuberculosis was communicable from the bovine species to man. So far as he could gauge the feeling of the meeting there seemed to be a consensus of opinion that there ought to be periodical inspections of dairies and cows by veterinary surgeons; that cows with tuberculous udders ought to be slaughtered, or else be segregated; that there should be compulsory and common legislation for the whole of the country; and that, lastly, he had come to the conclusion that there was a general refusal at that meeting to finally accept Dr. Koch's statement of inoculability of tuberculosis from man to animals before further and much more sweeping experiments were made.—(Hear, hear.) The profession, therefore, ought not to relax their efforts, but continue to take all possible precautions.—(Applause.)

The proceedings then terminated.

On Thursday, Section 4 again met at the Polytechnic, the chair, as before, being occupied by Sir George Brown.

Mr. JAMES KING, M.R.C.V.S., Veterinary Inspector of the City of London, read a paper on "Tuberculosis and the Meat Supply."

TUBERCULOSIS AND THE MEAT SUPPLY.

BY JAMES KING, M.R.C.V.S., VETERINARY INSPECTOR, CITY OF LONDON.

"MR. PRESIDENT AND GENTLEMEN—On being asked by your Secretary to open this discussion on tuberculosis and the meat supply, I must say that at first I felt very reluctant to undertake it, my opinion being that it might have been placed in more able hands. However, having exceptional opportunities of making post-mortems on our food animals, after duly considering the matter I acceded to his request, in the hope that by so doing I might be able to give this Congress an idea of the prevalence of the disease and the enormous loss to the country through its ravages.

"The subject that we have met to discuss to-day is one of great moment, not only to the meat-trader but also to the profession generally. Tuberculosis is the cause of great loss and dissatisfaction to the farmer and also to the meat-trader; so much so, that many of the latter, after endeavouring to the utmost to follow the trade of their ancestors, and to deal only in home-fed meat, have found themselves compelled, through losses arising from disease among their cattle, to abandon it. The cases are rendered the more trying since neither expert nor trader can by ordinary inspection detect the malady in open market. Inspection is now becoming more general, and better trained and more qualified officers are appointed than was the case formerly. The Health Acts, too, are more stringent for the protection of the public. The butcher therefore concludes that, as there is no Act to protect him, and the passing of an animal by a veterinary inspector in an open market is no guarantee that what he purchased at a good price as sound and fit for human food will turn out to be so, or that money value will be realised, what is considered in his case as a trade risk is much too great. He therefore finds it necessary to protect himself by leaving live cattle alone and obtaining his supplies from the dead meat markets. Here he can select what suits his trade, without fear of confiscation and prosecution by reason of tuberculosis. In our dead meat markets the home-fed meat has to compete with the

foreign, which may be home-killed or otherwise, and if the supply of the former be limited or the price not suitable, the butcher is tempted to purchase the latter, and invariably finds that he can do so to advantage. The quality may be only slightly inferior or possibly equal to that for which he had been accustomed to take so much trouble and run so much risk. He consequently continues to purchase the foreign and his customers become educated to its flavour. Thus, to the great detriment of our home supply, he may be able to furnish them with apparently as good a joint at less cost, for once the price of meat has been reduced it is difficult to raise it again.

"This seriously affects the farmer and the tradesman, for in the first instance the home animal has to be raised and fed at considerably greater expense than its foreign competitor, and the butcher, in addition to the risk of losing the carcase through its being a subject to tuberculosis, finds it harder still to make his purchase at a rate which will protect him from serious loss. He knows from experience that, no matter what class or breed he may buy, the risks are identical. His ox may cost £30, and yet after slaughter, not infrequently, the carcase is found to be so extensively pervaded with tuberculosis as to render it unfit for human food, and it therefore has to be condemned.

"It is common knowledge that a very large percentage of cattle in our best herds are subjects of the disease, and further that it is impossible by ordinary examination to find any clinical evidence of the malady. I have had occasion to make post-mortem examinations of some of the best cattle our country produced, and which were exhibited as such at our principal shows. After slaughter it has been absolutely necessary to condemn parts of them for tuberculosis. This has been a well-known fact for many years past, and yet nothing of any consequence has been done to check the prevalence of this scourge, although it is generally admitted to be one of the sources of infection to human beings, and the means of mitigating the evil are placed in our hands. A few stock-holders, capable of affording it, have made voluntary attempts to remedy the state of things, but their small efforts, although demonstrating what might be done if powers were granted by Act of Parliament, do nothing to effectually check the ravages of the disease, or to restore the lost confidence of our meat traders. To these agriculturists must look, for unless they can find purchasers for their cattle at remunerative prices it is of no use for them to rear and feed stock.

"I have been a veterinary inspector now for over ten years, and for six of them I had the supervision of a large provincial meat market. From careful observation I have come to the conclusion that there is a growing demand for foreign meat, and a corresponding decrease as regards home-fed. The reason given by the salesman is invariably that the loss is so great through having the carcases of home-fed cattle condemned on account of their being affected with tuberculosis, that they are driven to the purchase of the foreign. Surely, this being the case, it points to the necessity for some action being taken by the Government. To realise the extent to which some of our cattle suffer from this disease it is necessary to be present when they are slaughtered. Sights are then seen which make one wonder how, large as the death-roll is from this cause, the disease is not more prevalent in human beings, and the urgent need for proper and systematic inspection under definite laws relating both to live animals and carcases, together with State aid by way of compensation, is obvious.

"With the object of ascertaining, as nearly as possible, the percentage of cattle affected with tuberculosis, the loss to the country, and the quantity of meat rendered valueless to all concerned in the matter, I have made searching post-mortems, as follows :—

[TABLE I.

"TABLE I.—Result of the Post-Mortem Examination of 1738 Animals, consisting of Cows, Bulls, Oxen, Heifers, and Calves.

	Cows.	Per Cent.	Bulls.	Per Cent.	Oxen.	Per Cent.	Heifers.	Per Cent.	Calves.	Per Cent.	Total.
Number of carcases and organs examined,	500	—	113	—	131	—	53	—	941	—	1738
Number of carcases free from disease, .	266	53·2	93	82·3	116	88·55	42	79·24	929	98·72	—
Number of carcases tuberculous, . .	234	46·8	20	17·7	15	11·45	11	20·75	12	1·27	292
Number of carcases with lesions in abdominal and thoracic regions, .	129	25·8	9	7·96	9	6·87	8	15·09	—	—	155
Number of carcases with lesions in thoracic region only,	87	17·4	7	6·19	3	2·29	3	5·09	—	—	100
Number of carcases with lesions in abdominal region only,	18	3·6	4	3·0	3	2·29	—	—	—	—	25
Number of carcases with lesions in mammary glands, . .	11	2·2	—	—	—	—	—	—	—	—	11
Number of carcases with lesions in testicles, . . .	—	—	1	·87	—	—	—	—	—	—	1
Number of carcases affected, . . .	67	13·4	5	4·42	6	4·58	5	9·43	5	·53	88
Number of carcases totally destroyed,	35	7·0	3	2·66	1	·76	1	1·88	2	·21	42
Number of carcases partially destroyed,	32	6·4	2	1·77	5	3·81	4	7·54	3	·21	46

Note.—All percentages calculated on the number of carcases examined.

"TABLE II.—Weight and Value of Meat and Viscera destroyed.

	Weight of Meat in Lbs.	Price per Lb.	—	Number of Whole Viscera destroyed.	Price Each.	—
		d.	£ *s.* *d.*		*s.* *d.*	£ *s.* *d.*
Cows, . .	16,832	@ 4	280 10 8	129	16 6	106 8 6
Bulls, . .	2,376	@ 4½	44 11 0	9	16 6	7 8 6
Oxen, . .	1,152	@ 5½	26 8 0	9	16 6	7 8 6
Heifers, . .	748	@ 5½	17 2 10	8	16 6	6 12 0
Calves, . .	480	@ 4½	9 0 0	2	5 6	0 11 0
Total, .	21,288	—	377 12 6	157	—	128 8 6

"TABLE II.—*continued.*

	Number of Abdominal Organs destroyed.	Price Each.	—	Number of Thoracic Organs destroyed.	Price Each.	—	Total Value.
		s. *d.*	£ *s.* *d.*		*s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
Cows, .	18	14 0	12 12 0	87	2 6	10 17 6	410 8 8
Bulls, .	4	14 0	2 16 0	7	2 6	0 17 6	55 13 0
Oxen, .	3	14 0	2 2 0	3	2 6	0 7 6	36 6 0
Heifers, .	—	—	—	3	2 6	0 7 6	24 2 4
Calves, .	10	2 6	1 5 0	2	3 6	0 7 0	11 3 0
Total,	35	—	18 15 0	102	—	12 17 0	537 13 0

"The above condemnations have been made in accordance with the recommendations of the Royal Commission on Tuberculosis. What the loss would amount to if the carcases of all animals affected with the disease were destroyed, as is recommended by some authorities, I leave you to conjecture.

With reference to the above tables I have taken great care to see that all the meat condemned was weighed, with the exception of the calves, and the figures enumerated are taken from average wholesale prices in the trade. In estimating the prices of viscera I have taken the figures from wholesale prices given by offal contractors, plus the price of fat, averaging 4 stone per beast at 1s. 6d. per stone. This is always destroyed with the viscera in cases of tuberculosis. The figures in the table relating to calves were obtained from Mr. W. F. Shaw, F.R.C.V.S., who made the post-mortems on behalf of the Local Government Board, in order to ascertain their freedom from tuberculosis. The whole of the carcases were inspected by me, and although a record of those affected with the disease was kept, their weight was not taken. I have, therefore, simply given an ordinary average weight.

"In addition to the loss sustained, as set out in Table No. 2, to form a proper estimate of the cost of this disease to the country, it will be necessary to include the amounts paid by Local Authorities for destroying such affected meat and offal, in order to comply with the Public Health Acts. These statistics would be very difficult to obtain, but would, I may mention in passing, total up to no small amount.

"Taking figures from the annual returns of the Board of Agriculture for Great Britain under the Diseases of Animals Acts for the year 1899, which is the last supplied me, I find that the estimated number of cows in Great Britain was 2,670,260, and taking the average life of a cow at seven years, it may be argued that one-seventh of that number is killed annually, viz., about 381,608.

"Therefore, if from the above table the percentage of those so affected with the disease as to render the carcases, &c. partially or totally unfit for human food be taken, we find by the simple rule of three that if a loss on 500 cows be £410 : 8 : 8 the annual loss on cows will amount to £305,067.

"For the purposes of this paper, let us now take the numbers from the same returns under the heading of 'Other cattle aged two years and upwards.' This will include the bulls, oxen, and heifers referred to in my table, as those were over that age. The number given by the Board of Agriculture is 1,341,310, and calculating the average life of that class to be three years, one may estimate that one-third of that number is slaughtered annually, viz.—447,103. Therefore, by taking the percentage of those affected with the disease, as shown by the table, we find by the same deduction that if a loss on 297 be £116 : 1 : 4, the annual

loss on cattle under this heading will amount to £174,726, making a total annual loss through this disease of £479,793.

"It is not necessary to take the loss in calves, as the percentage of disease amongst that class is so small that it may be looked upon in the ordinary course as a trade risk, and need hardly have any effect on our meat supply.

"Can it be wondered from the foregoing figures (although approximate) that the trade in foreign meat has made such enormous strides within the last few years?

"If we refer to the agricultural returns of the Board of Agriculture for 1900 we find that under the head of fresh meat imports it is reported that a quota which formed only one-fifth of a single pound per unit of the population in 1866-1870 has expanded to little short of 20 lbs. per head on the average of the five years 1896-1900, and has touched 22·5 lbs. per person in the single year 1900, an instance of progress quite out of all proportion to the development of other forms of imported food.

"On again looking at the returns of the total number of cattle in this country for the last ten years, we find that the year 1900 shows a decrease, as compared with the year 1891, of 47,821. These figures denote that, although our population is steadily increasing, as are also our meat-eating propensities, nothing is being done to supply the increased demand with home-fed cattle. In our live stock markets at present, although returns show that supplies are not so plentiful as in previous years, there seems a difficulty in salesmen realising profitable prices for beef cattle.

"In conclusion, I am convinced from personal observation that the principal cause for this state of things is tuberculosis, and we are not improving it by our present voluntary efforts to purify some of our stock by the use of tuberculin, as this undoubtedly throws a much larger number of known tuberculous animals on the market, and increases the risks of the butcher, and thus making the purchase of home animals more of a gamble than a legitimate trade. Is it then surprising that he purchases foreign meat to supply his customers instead of the home article?

"I have endeavoured to place before you in these few remarks, as clearly as I can in the time allowed, the present state of affairs, which has now been going on for years, and there can be little doubt that the cause is on the increase. I cannot conclude without asking how long this will be allowed to continue in our midst before any active steps are taken to eradicate, or even reduce, the prevalence of this disease."

The PRESIDENT in opening the discussion said the subject was a very important one, and the paper was thoroughly practical from beginning to end. The recent Royal Commission, of which he was a member, had gone into the question thoroughly, and fully recognised the extraordinary irregularities and the utter want of system which occurred in meat inspection. No advantage would be gained by members of the Congress merely complaining of the hardships which were inflicted: what was wanted were strong recommendations to be made to the Government.

Mr. BOWEN JONES said he would put forward some propositions, which he believed would lead to practical legislation. Paragraph 20 of the Report of the Royal Commission on Tuberculosis stated that "the provisions of the general law in respect to the inspection of meat in England and Wales, outside the administrative County of London, are contained in the Public Health Act, 1875, and the Acts incorporated with it. Sections 116 to 119 of the Act of 1875 enable any medical officer of health or inspector of nuisances to inspect and examine any animal, carcase, or meat exposed for sale, or deposited in any place for the purpose of sale or of preparation for sale, and intended for the food of man. If it appears to him to be unfit for human food, he may take it away to have it dealt with

by a justice." He therefore now moved—"That this Congress is therefore of opinion that it is desirable that the general law should be so amended as to compel county, county borough, and other Local Authorities to periodically enter and examine, by means of qualified inspectors, all places within their respective jurisdictions, used for the sale of butchers' meat, or the slaughtering of cattle. And if upon such examination any animal carcase or meat exposed for sale or deposited in any place for sale, or of preparation for sale and intended for the food of man, is found to be affected with tuberculosis, to take it away and have it dealt with by a justice. That the owner of any animal or carcase or meat confiscated and destroyed wholly or in part by order of a magistrate, shall receive full compensation and repayment of the amount paid by him therefore provided—(*a*) That the magistrate ordering confiscation should satisfy himself that the animal with a good appearance before slaughter was well nourished and exhibited no visible signs of tuberculosis; (*b*) that no compensation shall be paid for any animal for which there has been paid less than a minimum price, to be fixed from time to time by the Board of Agriculture according to the market values current, nor in excess of a maximum price, to be fixed in the same manner; (*c*) that no sum shall be paid in compensation except on the order of the magistrate ordering the confiscation of the carcase; (*d*) that all compensation so ordered shall be charged against and paid for from imperial funds." If farmers and butchers were to suffer for the public good, then the imperial exchequer should bear the burden.—(Hear, hear). He further proposed, "That, as recommended by the Royal Commission, the Local Government Board be empowered to issue instructions prescribing the degree of tubercular disease which should cause a carcase or part thereof to be confiscated. That the owner of the animal, carcase, or meat confiscated shall have the right of calling rebutting evidence in case of confiscation."—(Applause.) He hoped that the weight of this Congress, added to the Report of the recent Royal Commission, would result in legislation such as was absolutely necessary.—(Hear, hear.)

Mr. FIELD, M.P., and Mr. WM. COOPER rose to second the resolutions, but the chairman ruled that they could not be passed at that meeting, but should be laid before the General Meeting, and have consideration on Friday.

Mr. MORGAN HOPKINS, speaking as a practical butcher, said that if every corporation in the kingdom had such inspectors of meat as the London Corporation, the trade would not have cause to complain. But unfortunately the majority of so-called meat inspectors had never opened the pages of the Report of the Royal Commission, which pointed out that if the disease was localised the whole of the carcases should not be destroyed. The question was not only a humanitarian, but a great economic question. The Congress was called together with the object of getting a remedy for tuberculosis, and it was not right, fair, or equitable that the country should expect the trade to be the sufferers through the condemnation of certain of the meat. If the meat was to be destroyed for the public good, then the trade ought to be compensated.—(Applause.)

Mr. JAMES CAMERON followed on the same lines.

Mr. J. H. HEATLY (Morpeth), having suggested that it might be a heroic action if Dr. Koch, after his recent statement, were to submit himself to the process of consuming tuberculous milk to try the result, went on to refer to Morpeth as one of the worst towns in the country for tuber-

culosis, the death rate being extraordinary high. There was no qualified meat inspector in the town, as there should be, and he was very pleased to support the propositions put forward by Mr. Bowen Jones.

Mr. MATTHEW BRECHIN (Glasgow) strongly complained of the obstacles put in the way of the trade by responsible officials, and heartily agreed with Mr. Jones.

Signor RUATA (Italy) read statistics which showed that tuberculosis was not so prevalent in animals in this country as formerly.

Mr. WM. COOPER, as a member of the London Corporation and one of the Cattle Markets Committee, said the Corporation had at all times taken the greatest possible care that their officers were of the very highest class, and there was certainly a great deal in that, for meat inspection could be performed in the way it should be. He wished it were possible that the officers, in whose hands the inspection principally rested, could have a congress amongst themselves and arrange one common line of action, so that there could be one uniform inspection throughout the country. So long as they had men with so many diverse ideas there would be unfair inspection. The law acted very badly; as things stood at the present time, there was really a premium for concealment of tuberculosis, but if compensation were allowed in cases where the animals or the carcases were condemned, there would be an end to that concealment. He entirely agreed that where cattle were kept principally in the open air there was very little tuberculosis, and in conclusion he quite agreed with the resolutions Mr. Jones had laid before them.

Mr. C. E. PEARSON (Sheffield) said a uniform inspection was greatly needed.

Mr. WILLIAM FIELD, M.P., said he was present as a delegate appointed by the Dublin branch of the National Association for the Prevention of Tuberculosis, as well as a delegate of the Veterinary Association. What brought him to the Congress was to assist in taking measures which were conceived to be most practicable and useful to put an end to tuberculosis. He was certainly not there merely in the interest of any trade or profession. He was bound to respect such an opinion as that of Dr. Koch, which would do a great deal to clear the air of certain cloudy theories which had been confronting scientists and the public for many years. From a study he had made of statistics, he had found that tuberculosis, as a disease in human beings, had decreased 50 per cent. in the course of a number of years, while on the other hand he found that the meat consumption of the population had nearly trebled. He earnestly hoped Mr. Bowen Jones' suggestions would be carried out, and he was sure it could be done without very great expense. It should be the business of the Government to provide for the prosperity of every trade which was composed of a tax-paying, fair-minded, and loyal community. A good deal of land in the three kingdoms was absolutely lying idle through the great importation of foreign meat, simply because there was no encouragement for breeding cattle at home.

Mr. COGGAN, President of the National Federation of Meat Traders, said he endorsed everything which had been said by Mr. King in his paper, and that he was one of those who were glad to know that they had such a man in their midst who acted in so fair a spirit and had set so noble an example throughout the kingdom.

Mr. W. F. ANDERSON, a member of the Corporation of Glasgow, explained the procedure in his city. In their case, he said, the magistrate

had to deal with the evidence before him, and as he was a county gentleman, he probably knew about as much of tuberculosis as a Sheriff knew about the law.—(Laughter.) If bovine tuberculosis was not communicable to man, why should they take all the trouble they did? He held, however, that there was need for some particular standard to go upon, and they must first of all consider and protect the public, while at the same time they did as little injury to the trade as possible.

Professor OWEN WILLIAMS said he spoke as a delegate sent by the National Veterinary Association, and could fully endorse what had been said by Mr. Bowen Jones, while he agreed in the main with Mr. Field. He particularly noticed that there was want of uniformity of meat inspection. The veterinary profession was of opinion that meat inspection ought to be made uniform, and to accomplish that inspectors should be appointed by the Government, and that all powers should be taken from the municipal authorities, who in turn received their instructions from the Government. He further agreed that it should be decided to change over the inspectors from one town to another, so that there could be no possibility of local influence preventing them carrying out their duties. He was one of the last to desire to cast reflection upon the honour of any man, but it would be decidedly better if the inspectors were placed in such a position that they could not possibly fall. He also strongly advocated that all slaughter-houses should be made public, and that inspectors should be appointed to visit them. It would certainly be quite impossible to stamp out tuberculosis if private slaughter-houses were to be permitted to exist in various parts of the country.

Mr. REEVES, Agent-General of New Zealand, said he rose to speak on this question because of some remarks which fell from a member of the Congress in connection with the difference between animals kept in the open air and those which were closely confined. What had been said was partly right. Undoubtedly there was to be seen much more tuberculosis in animals kept under cover; though in Queensland and New Zealand there were hardly any instances of animals being kept in that condition. Nearly every one lived in the open air.—(Hear, hear.) In Queensland there were as many as five millions of cattle kept in the open air, and in New Zealand something like one and a quarter million; yet he was sorry to find that there was tuberculosis in both places, requiring the very closest inspection by the Government and its veterinary inspectors. After a very close examination and discussion by the Government and its officers, a law had been passed in New Zealand to the effect that every town having 2000 inhabitants should erect public abattoirs; that the slaughtering should be subject to Government inspection, and that the officers should be appointed by the Central Department of Agriculture, and be the paid officers of the Central Government. When it happened that beasts were condemned to be slaughtered which were the property of the farmers, then the farmers were paid half the value of the beasts. The Government then took the carcases, and instead of their being given to the pigs or any other animal as food, they were reduced by the steaming process and used as manure. The result of all that was that it was quite a common thing for a farmer who suspected the existence of tuberculosis asking the Government inspectors to come and make an inspection. In that way it was considered they were getting the better of tuberculosis, and in the course of a reasonable time they hoped to find that it would be pretty well stamped out.—(Applause.)

Mr. Wm. Hunting said the theory of meat inspection as he understood it was to protect the public, and the absolute fact was that the practice was to inspect less than half, and that was really done as a rule by men who knew nothing about it. The result of it all was that the grossest injustice was done to the meat seller. As far as he could see, the only way to protect the public against tuberculous meat was to make the meat regulations part and parcel of a larger and more uniform scheme under the Board of Agriculture for the stamping out of the disease at its source. At present there was no control upon the breeder or feeder to induce them to keep their herds healthy. It also struck him that unless they joined in the demand for general measures against the disease, it was somewhat illogical to ask for compensation for the butcher as the law stood, because just as the farmer now had no interest, so the butcher, having no compensation, would have no interest in looking after the disease. If a logical set of measures was to be passed against tuberculosis, then they must provide not only for the disease when the animals were in the hands of the cowkeeper and butcher, but when in the hands of the breeder and feeder. Suggestions were put forward to the effect that they ought to move Parliament. That was a difficult job, and it could only be done in front of a general election when the candidates were in that condition that they would promise anything one desired.—(Laughter.) A good deal might be done by the Board of Agriculture, which was the body who looked after the cattle, and the Local Government Board. But if it was difficult to move a Department, it must not be forgotten that it was absolutely impossible to move a Government.—(Applause.)

The discussion was then closed, and Mr. King replied. He said his object was to provoke discussion, and he thought he had been very successful. He did not think he could add anything, as most of the speakers appeared to agree with him.

On the motion of Mr. W. Field, M.P., a vote of thanks was passed to Sir George Brown for presiding, and the proceedings terminated.

On Friday morning Sir George Brown, C.B., presided again over Section 4, held in the Polytechnic, Regent Street, when there was a large attendance to hear the somewhat lengthy paper by Professor Duncan M'Eachran, of M'Gill University, Canada, as to "Legislation suggested for Controlling and Eradicating Tuberculosis in Animals." At the outset the Professor said he was a member of the medical profession, and for the past twenty years had been largely engaged in stock-raising. When, therefore, he had prepared the paper both as a stock-raiser and as Chief Inspector of Stock for Canada, it would be conceded that he had had a good deal to do with the subject, and that any suggestion which he might make might have a direct bearing upon it and be of a practical nature.

LEGISLATION SUGGESTED FOR CONTROLLING AND ERADICATING TUBERCULOSIS IN ANIMALS.

BY PROFESSOR DUNCAN M'EACHRAN, M'GILL UNIVERSITY, CANADA.

"The subject for discussion which I have the privilege of introducing to-day is one of very serious import, and one which requires to be very carefully considered in all its various bearings—lest by proposing impractical enactments we

nullify our good intentions, and give rise (as has already been done in some countries and States) to bitter opposition by the owners of infected herds.

"Our efforts must be to educate the people so that they themselves will voluntarily adopt our suggestions, and, with the assistance of the State, bring about a gradual diminution in the numbers of tuberculous animals in our herds, and the adoption by every stock-owner in the land of thorough preventive measures by which reintroduction of the disease will be rendered impossible.

"The first step, therefore, which I would recommend is the publication and distribution among the masses—the agricultural population in particular—of information on the subject of Tuberculosis. Much good work has already been done in this direction, but more must be done. If we look back for thirty-five years, when Villemin, Viseur, Chauveau, Gerlach, and others were engaged in demonstrating the contagious character and transmissibility of this disease, and compare our scanty knowledge then with the vast amount of information which, thanks to Koch, Bang, Nocard, and many others, we now possess, it will be easily understood why we who have been in the field of active work in the practical sense, as practitioners and advisers of our Government, have in early days hesitated to advise active control or eradication measures, and why the Governments have been slow to pass enactments bearing on the subject.

"It was in 1882 that Koch first communicated the results of his investigations of the etiology of Tuberculosis before the Physiological Society of Berlin, followed by further communications later. The knowledge of its transmissibility being due to a specific bacillus led to much investigation and experimentation. The reports and contributions to the literature of Tuberculosis have for many years filled our journals and bookshelves to such an extent that no excuse is left for ignorance concerning the subject on the part of those interested in it.

"In citing evidence in support of any suggestions one may make as to legislation necessary to enable the people, assisted by the Government, to control and subsequently eradicate tuberculosis from the lower animals, we necessarily must consider the measures tried by those countries, especially in Europe and America, which have dealt with it. It is to be hoped that in the course of the discussion some new practical suggestions will be adduced which this Congress can recommend for adoption.

Until Koch demonstrated that tuberculosis was due to the invasion of an organism, the tubercle bacillus, communicated either directly from an infected person or animal or by intermediate sources of infection, especially by buildings, pathologists were content to attribute its existence and extension to heredity. When, however, its real nature and its pronounced contagious character came to be known, both medical and veterinary practitioners stood aghast in contemplation of the thousand and one blunders which crowded their memories consequent on want of this knowledge.

"I remember well when, thirty years ago, I had temerity enough to read a paper based on the Continental investigations above referred to, before the Medico-Chirurgical Society of Montreal, in which I ventured to say :—'The experiments of Continental investigators have clearly established the close relationship between tuberculosis in men and in animals, and the possibility of the disease being in many ways transmitted from the one to the other ; and I am well aware that this disease is far more prevalent in the dairy herds supplying milk to the citizens of Montreal than is generally known ; therefore, I feel it my duty to invoke the aid of this society in endeavouring to bring about certain sanitary improvements in connection with our meat and milk supply by the establishment of abattoirs under proper inspection : supervision of dairies and inspection of milk.' Such was the limited information on these matters at that date, that of about forty members present only one was in sympathy with the statements made. He was at the time a young man but recently graduated, who has since made his mark in the world of medical science—I refer to Professor Wm. Osler, of John Hopkins Hospital, Baltimore. He alone would admit even the probability of contagion, or intercommunicability from animals to mankind, or from mankind to animals—a doctrine which was to sweep away their long-cherished belief in heredity as its sole cause.

"Pursuing this subject by close observation and numerous investigations of herds in Canada, in which this disease existed, instance after instance came to my knowledge of cases where the infecting animal was clearly traced to a diseased herd.

"Valuable herds were destroyed by its introduction, and several owners brought to the verge of ruin. At the period to which I refer shorthorn cattle (Bates and Booth families) had attained fabulous values, £5000 being a common price for a Duchess heifer, one cow being sold for nearly £9000 in the State of New York. Many of them were tuberculous.

"The frequent discovery by clinical examination of cattle imported from Britain passing through our quarantines, tuberculosis not being legally classified as a contagious disease at that time, obliged me to urge on the Government the necessity of amending the Animals Contagious Diseases Act so as to include tuberculosis in the list of contagious diseases. This was done in 1886, thus enabling us to put a stop to such dangerous animals being admitted to the country to the serious detriment of our home herds.

"Members of my own, and of the medical profession, did not hesitate to say that this act was premature owing to the etiology of the disease being not then sufficiently understood.

"Were proofs wanting of its contagiousness, I could furnish sufficient to convince the most sceptical, but I would be wasting your time by their recital. I must, however, crave your indulgence for a few minutes while I make some general allusions to this characteristic of the disease.

"The infection of healthy animals we know takes place readily from cohabitation, the bacilli gaining entrance by the respiratory organs in most cases, but by the digestive tract in many, especially in calves when suckled by diseased mothers, and calves, pigs, and other animals fed on milk, or on dairy bye-products containing living bacilli. In pigs when allowed to eat tuberculous matter found in carcases and slaughter-house refuse given them as food; probably, too, in rare instances, from eating the flesh of tuberculous animals. It is to the buildings themselves, however, we must look for the chief source of infection, and to neglect of disinfection and sanitation must we attribute in a great measure the continuance of the disease and reinfections with which we are familiar. I could cite repeated instances of herds cleared out and new purchases made, with every care in purchasing, being followed by new cases of tuberculosis; so that I feel that too much trouble cannot be taken by practitioners who are employed to eradicate this disease, to make sure that the buildings are aseptic, and that sufficient air-space is provided as well as a rational system of ventilation, whereby pure air is admitted and foul air driven out, also that properly trapped drains carry off the liquid excrements and prevent the return of noxious vapours.

"The importance of pure air and sunshine cannot be overstated in considering the prevention of tuberculosis. It is, however, a mistake to suppose that infection will not take place when diseased and healthy cattle are brought together, even when these conditions exist in the very highest degree.

"I have seen tuberculosis prevalent in ranche cattle, few of which were ever under a roof, ranging on the foothills of the Rocky Mountains in Montana. I have known a valuable herd of polled Angus which was brought into the Peace River country in the far North-West of Canada, which proved to be tuberculous and was ultimately exterminated in consequence. In these and other instances which might be referred to, pure air and sunshine certainly prevailed, yet it did not prevent infection taking place, when they were congregated in corrals, bunched together during fly-time, or in infected sheds in winter.

"HEREDITY.

"To eliminate heredity entirely from the causative faculty would be an error; but we are safe in saying that it plays a very unimportant part in its extension. The rarity of the disease being found in calves at birth in all countries has been noticed by Professors Bang, Siedamgrotzky and others, and the immense success attending the rearing of calves from tuberculous cows by Bang's system in

Denmark and other countries, including Canada, proves conclusively that it is not hereditary in the same sense as gout or insanity are known to be transmitted from parent to progeny.

"When visiting Professor Bang at Copenhagen, three years ago, he showed me two newly-born calves sent in by an inspector; in the livers of both tubercules were found.

"Uterine tuberculosis when seen is generally associated with generalised miliary tuberculosis, especially when it is peritoneal.

"The rarity of tuberculosis in the male genital organs precludes the probability of infection by copulation, except in very rare instances; hence we infer that when the newly-born calf is found tuberculous, infection has probably taken place within a diseased uterus.

"By far the most numerous infections have occurred after birth. Bang says:—'I had occasion to observe more than 400 cases of tuberculosis either in fœtuses or newly-born calves; nevertheless, the number of congenital tuberculosis has scarcely gone beyond 0·33 per cent. of the killed calves even in the most infected regions.'

"While intra-uterine infection from a diseased mother is occasionally seen, congenital tuberculosis plays a very unimportant part in the continuance and extension of the disease, compared with the many ways in which the essential factor in its production, viz. the tubercle bacillus, gains an entrance to the animal body,—in other words, tuberculosis is a contagious disease, not an hereditary one as was supposed.

"The Diagnosis of Tuberculosis.

"The clinical diagnosis of tuberculosis, even by the most expert clinical examiner, except in advanced cases, is always unreliable, as tubercule may exist in such a stage as would be impossible of diagnosis by this means.

"The Tuberculin Test.

"The discovery by Koch, in 1890, of the production of fever, indicated by a rise in temperature, in tuberculous animals into which he injected a sterilised glycerine extract of pure cultures of tubercle bacilli, while it produced no effect whatever when the animals were free from that disease, furnished us with a simple but very reliable diagnostic agent.

"The effects produced by this discovery on the commercial aspect of the business of the dairyman and cattle-breeder have been in many instances most disastrous. Herds which were supposed to be free from disease were discovered by this test to be tuberculous, dairy businesses have been ruined—justly so we must admit—for no man has a right to sell milk, or dairy products manufactured from them, when derived from diseased cows, any more than a breeder of pure-bred stock has to sell animals suffering from a contagions disease from which recovery is the exception.

"This exposure by this means of the prevalence of the disease, especially in dairy cattle, naturally aroused anxiety in the minds of the guardians of public health; a furor was thus created, and the public mind greatly disturbed when, in addition to this, its intercommunicability to human beings was made known.

"Hence we find many dairymen and cattlemen in all countries denouncing tuberculin, and protesting against its use; not all dairymen, nor all breeders, however, joined in the denunciation of what is well known to be a safe, harmless, but reliable means of detecting this disease, even in its most incipient stages.

"In Canada during the past year, from 1st November to 1st November, there were 17,785 head of dairy cattle tested officially by voluntary application of the owners, on condition that the entire herd be tested and all reacting animals quarantined for life, without compensation. Of this number only 358 reacted. or about two per cent.

"What opposition we met with came from breeders who had suspicious herds, or herds which, by private testing, were known to be diseased; it came chiefly from men who combined importing for speculative purposes with breeding.

"In some of these cases the importers, we have reason to believe, were not ignorant of the cattle being tuberculous; in others we fear the man who paid the money was a victim of imposition or gross neglect of his interests on the part of his agent.

"I will cite one instance of each case which came under my personal notice.

"(*a*) A herd of thirteen cattle arrived at Point Levis quarantine—two of them showing clinical symptoms of the disease; examination of the chart which accompanied them showed that it was not genuine. It was therefore decided to test them, to which the person who had imported them objected, and while correspondence was going on one cow died from acute generalised tuberculosis; of the rest all reacted but one, and on post-mortem examination all were found tuberculous.

"(*b*) A gentleman of large means decided to import a herd of useful but not high-priced shorthorns. He sent an agent to purchase and import them. This agent was instructed to use every precaution by testing, and otherwise to secure animals free from tuberculosis. They were bought in Ireland without testing them; they were brought to Scotland, there tested; two were rejected, the balance shipped to Canada with a chart which was not quite satisfactory, and on testing them, by request of the owner, five out of thirteen reacted.

"Personally, I believe with Professor Nocard that tuberculin does not lie; how is it then that so many tuberculous cattle come to us in America accompanied by charts and certificates of health?

"If the importer is a party to fraud, then he should be severely dealt with; if negligent, then he should pay the penalty of his negligence, for he has no right to import animals suffering from a contagious disease.

"Is it possible that agents or middlemen deal in suspected cattle—which are bought knowingly by the one class of importer, or foisted on to the other? Is the professional man, employed to test for export, imposed on by previous tuberculination nullifying or at least rendering uncertain his honestly applied test? Are all such men above suspicion? My own experience in a few instances in Canada compels me to say no, or is it the tuberculin that is at fault?

"When we meet with reactions varying from forty to ninety per cent. in cattle certified as healthy, as is found in both Canadian and United States' importations, such questions force themselves on us, and are sufficient explanation of why both Governments have each decided to keep a professional man in Britain on whose charts alone will cattle be allowed to pass through our quarantines without retesting.

"REACTION.

"We are often asked by importers and testers in Britain what reaction we consider indicates tuberculosis. Experience had taught us that it is not the extent of the rise in temperature so much as its character taken in conjunction with attendant circumstances. Ordinarily a rise of 2° F. above the highest normal is due to tubercle being present; but the single occurrence during the day of such a rise may be due to some accidental circumstance. A typical reaction is arched, the maximum temperature occurring the 17th hour, falling to normal about the 24th hour or sooner in many cases. The character of the reaction may be altered by copious draughts of cold water, or a lowering of the body temperature from any cause; so also does the raising of the body heat from such causes as flies, atmospheric heat and scarcity of water, all of which produce variations in the reactions. In addition to which might be mentioned applying the test when the animal is excited from any cause, such as driving cows from the field to the stable, railroad journeys, steamboat conveyance, change of climate, change of byre, bulling, stage of the disease (in advanced cases often no reaction follows), and what to us is most important, the uncertainty of reaction for months after injection of tuberculin.

"As I said above, tuberculin can be almost absolutely relied upon if properly used; there is no other diagnostic agent to be compared with it, yet it is capable of much abuse, and is often improperly used.

"OBJECTIONS URGED AGAINST THE TUBERCULIN TEST.

"In my opinion there is not one argument used by cattle-owners or importers against its use tenable. I have never known a single instance of a person owning a healthy herd lifting his voice against it, but I could multiply instances of men becoming almost maniacal in their denunciation of the test since it has been required in the international live stock trade between the United States and Canada, as well as importations from Europe; men whose herds when tested reacted sufficiently to warrant one in suspecting previous knowledge from private testing on their part.

"With a view to get at the truth of some of their objections I sent a circular letter to inspectors throughout Canada, in which I asked replies to the following questions, suggested by newspaper discussions on the subject:—

"1. 'Do you know of any cases in which the use of tuberculin as a test has produced abortion?'

"2. 'Do you know of any instance in which a bull has been rendered impotent by the use of tuberculin?'

"3. 'Do you know of any case in which the general health of the animals has been injured by the tuberculin test?'

"4. 'How many cattle have you tested during the past year?'

"5. 'How many post-mortem examinations have you witnessed of animals condemned in consequence of having reacted to the test?'

"6. 'In how many instances did you fail to find tubercle?'

"The replies are all negative to the first three questions; to the fourth they aggregate 22,023 head; to the fifth 579, and to the sixth ten, and one doubtful.

"Professor Leonard Pearson, State Veterinarian for Pennsylvania, states, in his report for 1899, that 'of 4400 post-mortem examinations made, tuberculosis was found in all but eight animals that had reacted.'

"I also sent similar questions to a few of the farmers who had most experience with it. The following replies will represent the others:—

"(*a*) In answer to the first question—'Do you think that the test injures cattle in any way?'—he says, 'No; I do not think there is the least injury in the tuberculin test. Our herd of over fifty head has been tested three years in succession, and I fail to notice any injurious effects whatever from the test.'

"In answer to question number two—'Have you ever had any bad results that you could attribute to the use of tuberculin?'—he says, 'None. I am using a bull that has been tested five years in succession, and is seven years old, and a more active healthy animal I never saw—a very sure animal you may judge by our dairy of forty-two cows—there is only one farrow. As to abortion, we do not have near the trouble that we had before we commenced testing, for I consider that we have a healthy herd now. Previous to the testing of our dairy we had very serious trouble with abortion.'

"(*b*) 1. I do not know of any case wherein the use of tuberculin has produced abortion, and on our farms we have tested cows at all stages, up to within a very short time of calving.

"2. I have never known of a case wherein a bull was rendered impotent or injured in any degree whatever by the use of the tuberculin test.

"3. I have not known of a single case wherein the application of the tuberculin test affected prejudicially in the slightest degree the general health of animals tested therewith.

"4. We have had between three and four hundred cattle tested.

"5. I have not personally witnessed any post-mortem examinations, but I have had reports from the veterinary surgeon who does our work on every animal which was condemned as a result of the test, and in almost every one positive traces of the disease were found."

"From these facts we deduce the following:—

"(*a*) Tuberculosis is essentially a contagious disease, and ought to be so classified and acknowledged by every country and state in the world as such.

"(*b*) It is insidious in its character, and in only a few cases comparatively can

it be diagnosed by physical examination ; but in tuberculin we have a safe and reliable test by which even latent cases can be diagnosed.

"(*c*) That tuberculin is harmless. It does not produce abortion in pregnant cows, impotency in bulls, or in any way produce any injurious effects on animals tested by it.

"METHODS ADOPTED BY DIFFERENT COUNTRIES.

"Some years ago, in Massachusetts, compulsory testing was tried, but was found to be impracticable, and met with strong opposition.

"Belgium adopted somewhat similar methods with similar results. It had to be given up, and at present the killing is restricted to animals in which the diagnosis can be made by clinical examination.

"In Switzerland free testing is practised. All clinically diseased are slaughtered ; reacting animals are marked by cutting out a triangular portion of the ear.

"In France, immediate slaughter of clinically diseased animals, and slaughter within one year of reacting ones.

"In Germany tuberculin is furnished free, and monetary aid is given to those who adopt the Danish system, and otherwise resort to prophylactic measures for its eradication. In most of the German States it is required to sterilise the creamery and dairy products and their bye-products, skim and butter milk.

"In Denmark free testing is done on voluntary application. Clinically diseased are killed, the others are divided into healthy and reacting. These are separated in different buildings, or partitions are used to divide the byres ; in one section the healthy, in the other the diseased, are placed. The reacting ones are bred from ; the calves are reared on milk from healthy cows or pasteurized milk, or milk which has been heated sufficiently to kill the tubercle bacilli. The success of this plan has been fully demonstrated by Professor Bang.

"In America—both the United States and Canada—for a number of years, all cattle imported from Europe were tested in the quarantines. A few years ago importers urged that the practice too often led them into serious losses—the value of the diseased animals as well as freight and other expenses incurred—and discouraged, as a consequence, importation generally ; and to meet the views of importers the Canadian Minister of Agriculture ordered that a number of veterinarians throughout Britain be selected, whose charts of test would be accepted without testing again in Canadian quarantines. This plan worked very badly, as numbers of diseased cattle were imported, several valuable herds being found clinically diseased, and were slaughtered.

"The United States had similar experiences with British charts of testing. This is regrettable, as both countries acknowledge the great results obtained by British breeders in producing excellent cattle, knowing as they do that on no spot on earth can cattle of equal merit be produced. There is something in the soil and the air of the sea-girt isle so favourable to the production of high-class bovines, that breeders abroad must come to Britain for fresh blood to keep up their herds, otherwise marked degeneration is soon apparent. For this reason each country, rather than prohibit importation altogether, has appointed a veterinarian to do the testing, and on their charts alone cattle are admitted to both countries without being tested in quarantine.

"In Canada testing is done at Government expense, when voluntary application is made for testing the whole herd, and reacting animals are quarantined for life. Bang's system is coming much into practice in Canada. In a few herds it has been successful in a remarkable degree. No compulsory measures have been tried. Tuberculosis exists in Canada to a limited extent only. No statistics for the entire Dominion are available, but the following figures indicate this. Testing has so far been confined almost entirely to dairy herds, and was employed in the most of these owing to suspicion or knowledge of infection.

Year.	Tested.	Reacted.
1897–98	6,516	412
1898–99	16,882	451
1899–1900	17,785	358

"The following regulations are enforced between the United States and Canada.

"BREEDING STOCK.

"Sect. 21. All cattle to be admitted for breeding purposes shall be accompanied by :—

"(*a*) A declaration made by the importer that they are actually for breeding and no other purposes.

"(*b*) A certificate signed by a Government veterinarian specially selected and appointed for this duty, that they have been subjected to the tuberculin test and found free from tuberculosis. Such certificates must show the date of testing and chart of reaction, with a description of the animal giving age and markings. The importer may be required to swear that the certificate refers to the animal represented.

"(*c*) A certificate of inspection signed by a Government veterinarian showing that the animals are free from contagious disease, and that no contagious disease of cattle (excepting tuberculosis and actinomycosis) exists in the district whence they came.

"(*d*) When not accompanied by such certificates the animal or animals must be detained in quarantine one week and subjected to the tuberculin test.

"(*e*) Should they be found tuberculous they must be returned to the country from which shipped, or slaughtered without compensation.

"FAT CATTLE AND CATTLE FOR FEEDING, INCLUDING RANGE CATTLE FOR STOCKING RANCHES.

"Sect. 22. This class of animals shall be accompanied by a certificate of inspection signed by an official veterinarian showing that the animals are free from contagious disease, and that no contagious disease of cattle (excepting tuberculosis and actinomycosis) exists in the district whence they came.

"SETTLERS' CATTLE.

"Sect. 23. Settlers' cattle when accompanied by certificates of health to be admitted without detention, when not so accompanied they must be inspected. Inspectors may subject any cattle showing symptoms of tuberculosis to the tuberculin test before allowing them to enter.

"Sect. 24. Any cattle found tuberculous to be returned to the United States, or killed without indemnity.

"The following extracts from copies of the laws and regulations governing the control and for the eradication of tuberculosis in individual States furnished me by the authorities may be cited with advantage and can be found more in detail in a bulletin recently issued by Dr. Salmon, Chief of the Bureau of Animal Industry, at Washington.

"STATE LEGISLATION WITH REFERENCE TO BOVINE TUBERCULOSIS.

"*Illinois.*—Legislation under Board of Live Stock Commissioners. Their rules and regulations are as follows :—

"All cases reported to Board. When physical condition indicated tuberculosis all exposures are quarantined till tested under direction of the Board. Rise of 2 degrees or more (if in opinion of veterinarian in charge is due to tuberculin) constitutes reaction, and such animals must be isolated and held in quarantine till slaughtered and examined post-mortem. Rise of 1·5 and less than 2 degrees are suspicious, must be isolated and quarantined for re-test. Maximum indemnity not to exceed 75 dollars.

Classification for Compensation.

Class A.—No lesions. Full appraisal.
" B.—Incipient disease. 75 per cent. of appraised value.
" C.—Infected for one year. 50 per cent. of appraised value.

Class D.—Infected for two years. 35 per cent. of appraised value.
„ E.—Infected for three years. 25 per cent. of appraised value.
„ F.—Infected more than three years. 15 per cent. of appraised value.

"Should proceeds of carcase exceed percentage valuation, owner receives full amount.

"'Definite legislation needed, with money to carry out provisions. Time not ripe for drastic measures.'

"*Iowa.*—No special legislation. Tuberculin used where necessity and public safety demands. Reacting animals tagged and quarantined, provision being made that they may be shipped to any abattoir in the State for slaughter, subject to inspection by Bureau Inspector, State Veterinarian, or one of his assistants. No remuneration save what animal will bring as fertiliser. 30 per cent. of the reacting animals are condemned on post-mortem.

"Work that is done, is done thoroughly, but more is needed.

"*Kansas.*—No specific law. Must be tested on entering the State. May be brought in for show purposes without test, but if sold, must be tested before allowed to stay in State. At the present time there is litigation as to legality of rules and regulations.

"*Kentucky.*—No special legislation. May be dealt with by State Board of Health. Animal cannot be condemned until examined by competent veterinarian. Indemnity is not provided.

"*Maine.*—Commission of three persons appointed by Governor. Necessary quarantine enforced, half compensation for animals destroyed providing they have been in the State a year or more. Compensation not to exceed 100 dollars for pedigreed or 50 dollars for grade stock. Appraisal not being accepted by owner, rigid quarantine enforced.

"Tuberculin test not officially designated.

"Regulations sufficient, but not enough funds for enforcing properly.

"*Massachusetts.*—General laws on contagious diseases cover tuberculosis. Compensation to full value not to exceed 40·00 dollars in any case. Tuberculin restricted to cattle brought in from without the State, excepting upon written request of the owner and on such animals as are condemned as being tuberculous by a competent veterinary surgeon. No compensation granted unless rules regarding disinfection, cleanliness, ventilation, light and water supply are complied with as directed by the Commission. Owners using tuberculin are not entitled to indemnity for animals which react, unless the testing is done by its Board of Cattle Commissioners, or by its direction.

"Regulations work well and good work done, but more money could be spent to advantage.

"*Michigan.*—General law on contagious diseases; no special on tuberculosis. State Veterinarian is acting under general law against tuberculosis. On complaint of Local Board of Health or individuals, suspected cases of tuberculosis are tested. Reacting animals are destroyed or rigidly quarantined. No provision against entrance of tuberculous cattle. Governor has power to prevent, but Commissioner has not seen fit to protect the State.

"*Minnesota.*—General legislation applies empowering Local or State Board of Health to act. Two tuberculin tests are required to condemn a tuberculous animal, and must be given within three months and in not less than two months. No further legislation. Experience shows inefficiency of procedure now in vogue.

"*Montana.*—Towns of 5000 or over to have meat and milk inspector, who must be a graduate of reputable Veterinary Medical College. All animals supplying milk to the public must have a certificate of tuberculin test, and are inspected every month. Laws just passed, and it is thought that they will prove sufficient if carried out to the letter. Not much tuberculosis in the State—only about 5 per cent.

"*New Hampshire.*—General law relates to tuberculosis. Co-operation is general with Federal Bureau. Indemnity, full appraised value, to be paid by towns, which are reimbursed four-fifths by the State. Such animals must have

been owned within the State three months before detection of disease. Cattle entering the State must be tested under authority of Board of Commissioners. Pasturage permits granted on physical examination by competent veterinarian—a graduate of a recognised school. Massachusetts cattle, tagged by the Mass. Cattle Commission, allowed to go to New Hampshire for pasturing and return to Massachusetts without test.

"Upon request by cattle-owner he may have his herd officially inspectsd by the Board. If inspector deems it necessary tuberculin is used, and owner must conform to measures prescribed by Board. Test applied at State's expense, and half value for all animals reacting. Precautionary measures to stamp out disease at owner's expense.

"Experience shows that enforcement of sanitary measures is as important as the destruction of diseased animals. Ventilation, light, exercise of animals, and disinfection regarded as the most important part of the work. Progress is being made in suppression. Radical measures not needed.

"*New Jersey.*—Commission of seven, composed of President and Secretary of Board of Agriculture and five others appointed by the President. Examine herds on request, but tuberculin test is optional with the Commission. Condemned animals appraised at market value, and three-fourths paid to owner. All cattle from without the State are tested.

"Gradually lessening prevalence by educating farmers as to its character and the need of greater care in breeding, stabling, sunlight, and ventilation.

"*State of New York.*—Tuberculin applied upon written request under conditions prescribed by Commissioner of Agriculture. Commissioner may order test, holding a reacting animal in strict quarantine. He may condemn, quarantine, or slaughter when tuberculosis is found on physical examination. Compensation shall not exceed 60·00 dollars for thoroughbred, and 40·00 for grade, providing animal is not found to be diseased at the post-mortem. If the animal is diseased with disease for which it was killed, or other dangerously contagious or infectious disease, no compensation is allowed.

"Animals entering the State passing the Federal authorities are allowed to proceed.

"*North Dakota.*—Tuberculosis under general legislation. State and district veterinarians can deal with subject. Cattle from without the State must have certificate of health or be examined by State official. Tuberculin test not specified.

"*Pennsylvania.*—All animals entering the State must be tested with tuberculin. Other testing left to discretion of Board. Compensation not more than 25·00 dollars for infected grade, and 50·00 for infected registered stock. Measures for combating this disease, as well as others, at discretion of Board, and are not flexible.

"*Rhode Island.*—Appraisal for 'scrub' animal 50·00 dollars, grade 75·00 dollars, and registered 100·00 dollars. In event of animal being found infected at autopsy, State pays half value, but if healthy full value. Animal must be owned within the State at least three months previous. Cattle coming into the State must be tested with tuberculin.

"*Utah.*—Cattle having tuberculosis shall not be kept by dairymen, and shall be killed by the Dairy and Food Commissioners. There is no provision for the tuberculin test or for indemnity.

"*Vermont.*—Tuberculin test without expense on application, and whole herd must be tested. Such herds cannot admit new animals unless they undergo the test. Reacting animals must be killed and buried or burned at the expense of the owners. Owners retain the hides. Board regulates right to re-test when considered necessary. Rules of Board, where herds are tested regarding disinfection, must be observed. Cattle entering the State from without must be tested by person approved by Board and expense borne by owner. Animals killed by written order of the Board appraised, such appraisal not to exceed 40·00 dollars. Post-mortem held, and if tuberculosis or other disease dangerous to public health is found, owner receives half appraised value. Such animal shall have been in the State six months previous to discovery of disease.

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"Experience shows that if rules are followed for disinfection, disease is stamped out. Persuasion used by Board to induce testing of suspected herd. Measures radical enough at present, for the public must be considered and be in sympathy with the movement rather than antagonistic.

"*Virginia.*—Tuberculosis is classed as a highly contagious and infectious disease. Board of Control of Agricultural College has power to enforce such measures for its control as are deemed necessary.

"EDUCATE THE PEOPLE.

"Educate the people by furnishing them with the most important scientific and practical facts known about the disease. Much good has been done in Canada by the distribution broadcast of bulletins from which the following items are extracted :—

"TUBERCULOSIS.

"This disease claims for its victims nearly, perhaps we might say, all the domestic animals, and few of the wild animals subjected to domestication resist the contagion, as is well known to keepers of menageries. Rats, mice, and other vermin which inhabit houses and outbuildings not only contract the disease but are active agents in spreading it.

"Some species are more susceptible than others, and contract it readily by eating food containing the germ of the disease, or inhaling the dried germs given off from the lungs, throat, uterus, or intestines of animals affected in these organs.

"The most susceptible of the domestic animals are cattle, swine, chickens, goats and rabbits. These contract it readily in the natural way, but it can be produced in sheep, dogs, cats and horses by inoculation with tuberculous material.

"Tuberculosis in the lower animals is the analogue of consumption in the human family. It is due to a similar germ (*Bacillus Tuberculosis Bovis*), but it is, however, more virulent than the human bacillus.

"It is communicable from other animals to man, and from man to the lower animals, by natural infection and inoculation.

"TUBERCLE.

"The germs (bacilli), which are living organisms of minute microscopic size, when they reach and become located in a tissue, produce local irritation and the formation of small reddened areas infiltrated with fluid and cells. These are the tubercles. As they become older they enlarge, and their colour is greyish or yellow from changes that take place within, causing the death of the central tissues. Their appearance and consistence in this way resemble that of cheese.

"These nodules may vary in size from a pinhead to a cocoanut ; often they are of stony hardness from the presence of lime salts. The tubercles may be confined to one organ or tissue of the body, such as the lymphatic glands, for example, of the mesentery or thorax, or the throat, udder, ovaries, &c., or they may be generalised throughout the body, the germs travelling in the blood circulation. In this way the abdominal organs (liver, spleen, kidneys, &c.) may all be involved, as well as those of the thorax, lungs, pleura, lymph glands, &c. Often the pleura and peritoneum are covered with grape-like excrescences whose appearances are characteristic of this disease. Wherever tubercles are lodged for any length of time, much destruction occurs in the affected tissue.

"THE TUBERCLE BACILLUS

"Is described as a rod-shaped organism, with rounded ends and a slight curve, requiring complex laboratory methods of cultivation and staining to prepare it for microscopic study.

"It is a parasitic organism, which is only found in the bodies and excretions of animals affected by this disease. It thrives badly in the sunlight, which is said to kill it in from a few minutes to several hours. This fact should be remembered in dealing with it with a view to preventing tuberculosis.

"The invasion of the animal's body by the entrance into it of living bacilli is

effected either through the digestive organs (ingestion), or by the respiratory organs (inhalation), by transmission to the sexual organs when the testicle is invaded, and by inoculation, or by a cut or abraded surface.

"Without the entrance of the living bacillus into the body, tuberculosis cannot affect it. It is the seed from which it grows, and it is as essential to the development of the disease as oats, peas, or potatoes are to reproduce these plants.

"WHAT RENDERS CATTLE SUSCEPTIBLE TO THIS DISEASE.

"Impaired health, from whatever cause it arises, renders cattle susceptible to tuberculosis. Heredity has been proved not to be an active cause of its propagation. It is well established by the experiments of Professor Bang and others that calves may be bred from tuberculous mothers, and if removed before the cow licks them or they have sucked their mother's milk, and placed in absolutely healthy surroundings and fed on milk from healthy cows, they can be reared and remain, so far as any inherited disease is concerned, perfectly free.

"In-and-in breeding by producing animals with reduced vitality, over-milking, under-feeding, want of sunlight and pure air, insufficient exercise, breeding too young, are all what may be termed predisposing causes to tuberculosis, and should be avoided.

"One breed of cattle is just as liable to contract this disease as another when subjected to the predisposing and exciting causes. Dairy cattle are more subject to it because they are more exposed—they are more congregated, more closely and continuously housed, their vitality more drained by heavy milking, and they are kept longer than the beef breeds. Their calves are more liable to milk infection, as they are fed on mixed milk, whereas the beef breeds usually suckle their calves. The majority of beef cattle are killed off at three or four years old, hence they are exposed to the contagion for a shorter term of life, which is spent more in the open air and in sunlight.

"HOW THE DISEASE IS USUALLY INTRODUCED INTO A HERD, AND HOW IT EXTENDS IN IT.

"A tuberculous bull is probably the most active agent in spreading this disease, both by cohabitation and sexual connection.

"Farmers cannot be over-cautious in buying a bull or in having cows served by one till he has been subjected to the tuberculin test and found free from the disease.

"Nothing should induce a breeder to allow contact with his healthy cattle by a bull till he has every assurance that he is free from tuberculosis.

"Tuberculous animals of any kind should be prevented from coming in contact with the cattle.

"TUBERCULOUS ATTENDANTS.

"Tuberculous attendants—men or women suffering from pulmonary consumption—should on no account be allowed to feed, milk, or have anything to do with cattle or pigs.

"The intercommunicability of the disease from animals to man, and from man to animals, is an established fact no longer open to discussion.

"The bacilli from the throat and lungs of diseased people or animals, being coughed up, adhere to and dry on the woodwork, walls, floors, and feed-boxes in buildings, cattle trucks, or stockyards, and the dust being moved about by air currents, being inhaled, infests the respiratory organs, the bacilli gain access to the blood-stream or lymphatic glands, or, mixing with the food in the hay-rack or feed-trough, find access to the stomach and intestines, thence through the blood or lymph channels to the abdominal glands and other organs.

"DANGER FROM MILK.

"The virulence of milk from tuberculous cattle, especially when the udder is diseased, has been clearly demonstrated. It will communicate the disease even

when diluted by mixing with large quantities of other milk in the creamery or cheese factory; whey is equally dangerous. Milk from cows in advanced stages of generalised tuberculosis is also dangerous, but milk from cows in early stages of localised tuberculosis may not prove infective to calves or persons fed on it. It should, however, be sterilised by heat before being used.

"The germs remain active in the skim milk and whey, and may produce the disease in calves fed on it. Milk obtained from creameries in districts where tuberculosis prevails should be raised in temperature for ten minutes to 180 degrees F. before being given to calves, otherwise living bacilli may be taken into the stomach, and, entering the lymph channels, produce the disease. As a precautionary measure, milk from tuberculous cows should not be received at creameries or cheese factories. Unless this is done creameries and cheese factories may become distributing agents of this disease to healthy herds. Milk from tuberculous cows is a frequent source of communicating the disease from cattle to people, especially children and old feeble persons.

"How to prevent its introduction to a Herd.

"See that your animals to begin with are free from the disease.

"Never bring any animal into the byre till you have ascertained beyond a doubt that it is healthy.

"Keep your own bull. Your neighbour may be obliging, but if careless about the health of his stock, you may suffer irreparable injury by accepting even the free use of his bull should the animal happen to be tuberculous.

"Conversely, if you have a bull, be exceedingly careful to see that no tuberculous cows are brought to him for service.

"Never allow a consumptive person to have anything to do with your cattle; make no mistake about this.

"Your byres must be well lighted—almost as light as outdoors; disease germs are killed by sunlight.

"Pure air and plenty of it is essential to health. This can only be provided by sufficient space. Let your cow stable be roomy.

"Drainage is essential to the purity of the air. Without proper and efficient drainage the air must become contaminated by the emanations from the droppings and urine of the cattle as well as by the decomposing vegetable matters with which they are mixed.

"Drain your buildings, and do it thoroughly.

"The ventilation is all-important. By properly arranged ventilators the impure air is removed and replaced by pure. The oxygen of the air is constantly being consumed in the process of breathing, and unless it is replaced it becomes unfit to sustain animal life. The constant change of the air in buildings inhabited by animals is absolutely necessary to preserve health.

"During summer weather most buildings are sufficiently ventilated by the doors and windows being left open; it is during the winter when cattle are housed that they suffer from imperfect ventilation.

"Proper ventilation provides for the admission of the pure and the escape of the foul air. As a rule, farmers' architects do not make sufficient provision for either. The air may be admitted by openings near the floor and by windows hinged at the bottom and dropping inward. The ventilators or air-shafts are usually too small. Most buildings require shafts three feet square, placed about twenty feet apart, in the middle aisle of the byre. The shafts should be divided inside into two by a partition extending from the top to within three feet of the ceiling, the opening being controlled by trap-doors opened or closed by cords running through pulleys.

"Cattle standing Head to Head objectionable.

"The common plan of arranging the byre, so as to save labour in feeding, by having an alley way with the heads of the cattle opposite each other is objectionable from a health standpoint, as it exposes animals opposite tuberculous cattle much more to the contagion than when they are placed with their heads to the

wall. They may be easier fed the former way, but they are easier cleaned the latter, and it has a decided sanitary advantage should contagious disease exist. Running water in troughs placed in front of the cattle is objectionable if tuberculosis is present, as by this means the germs may be carried to the whole herd.

"SYMPTOMS AND DIAGNOSIS OF TUBERCULOSIS.

"In the majority of cases the symptoms are obscure, and till the discovery by Professor Koch of the reaction produced by the injection of tuberculin (being a most reliable test for discovering this disease in obscure cases unrecognisable by symptoms), the majority of cases could not be detected even by experts.

"When affecting the lungs, throat, and respiratory organs generally it is accompanied by a frequent cough but no fever. There is disturbance of respiration, the breathing is quickened by slight exertion or excitement, the cough is produced by changes of temperature. The expert can detect dull spots surrounded by areas of increased resonance on examination of the lungs by the usual methods. Usually the superficial glands in the throat, between the jaws, under the ear or the udder may be hard and swollen. The animals may continue for months or even years to maintain fair condition; they are sometimes fat, while the lungs may be found studded by large tubercular masses.

"When the disease is abdominal and the glands and organs in the belly are chiefly affected, the symptoms of defective nutrition are early apparent—emaciation, lessened secretion of milk, indigestion, breathlessness, and general failure more or less rapid. Many cases cannot be detected by symptoms, but can be almost to a certainty by the tuberculin test.

"THE TUBERCULIN TEST.

"Until the discovery by Professor Koch, in his experiments to find a cure for consumption in human beings, that the injection of tuberculin invariably caused a rise in temperature when the person or animal was tuberculous, while it produced no effect whatever when free from it, the detection of the disease in early stages or when slightly affected was considered impossible in most cases. This test is most delicate and reliable (about 98 per cent.) where it is properly applied.

"Tuberculin is a soluble product of cultures of tubercle bacilli, of which a glycerine extract is made, which is sterilised by heat and filtered through porcelain, so that it contains no living germs, and therefore cannot produce tuberculosis in animals injected with it. It has, therefore, no effect on healthy animals; in some cases the disease is aggravated by it when it exists, but it cannot be produced by it.[1] The lymph must not be exposed to sunlight; it must not be frozen, and must be kept well corked to exclude air.

"Tuberculin injection has no bad effects on the secretion of milk. The consensus of opinion of those most experienced is that it does not lessen the secretion of milk in dairy cattle, consequently they may be tested even when in full milk without disturbing its secretion, unless it be during the few hours of its absorption.

"It has never been known to cause abortion in cows or sterility in bulls, as has been claimed by its opponents; in fact some breeders state that it lessens abortion.

"The consensus of unprejudiced opinion is that it is harmless in cattle, even when tubercle is present, and in some cases it exercises curative influence.

"DOSE.—The dose varies with the size and age. As issued by the Department of Agriculture it is ready for use, with doses marked on the bottle, viz.: twenty drops for calves, forty for small or medium-sized animals, sixty for larger, and eighty drops for very large ones.

"When second tests are considered necessary, at least ninety days should elapse and the doses be slightly increased. Second tests are quite unreliable and often deceptive.

[1] It would be as reasonable to expect barley to grow from whiskey placed in the ground as tubercle from injecting tuberculin into an animal body.

"How to deal with a Diseased Herd.

"When tuberculosis is discovered in a herd, immediately remove the diseased ones from the healthy to an isolated stable, or a part of the byre may be partitioned off by close boards as far as possible from the rest of the herd.

"In the case of low-priced cattle the owner will best serve his own interests by slaughtering them at once. When they are especially valuable and in calf, the experiments of Professor Bang and others show that the calf may be saved by removing it as soon as born, and before the cow has licked it, or it has been suckled by its diseased mother, and by placing it in an uninfected building and feeding it on milk from tested cows it will in all probability grow up free from tuberculosis. The herd should be tested every six months, and those which react likewise removed till all trace of it disappears.

"Disinfection of Premises.

"Most careful and complete disinfection of buildings and yards in which diseased cattle have been kept should be employed to rid them of disease germs. In doing this, before sweeping, sprinkle the floors and walls thoroughly with water to prevent dust rising, removing drinking troughs, feed-boxes, and stall divisions. The floors must be specially scrubbed, the walls, ceilings, and partitions should be carefully washed, and all freely sprayed with a disinfection solution, such as carbolic acid, one pint of crude acid to four gallons of water, or lime-wash. It may be applied by a whitewash brush or a spraying pump, care being taken to see that every corner, crack, and joint is thoroughly penetrated by it. The cleansing and disinfectant should extend to drinking troughs and fences of the barn-yard to make disinfection complete.

"Disposal of Tuberculous Carcases.

"Should the disease be local, as is frequently the case, being confined to one or more glands, the flesh can be used as food with impunity. Infection from flesh is an extremely rare occurrence, and most unlikely to occur if it has been thoroughly cooked. This can be most relied on when it is cooked in the minced form; deep-seated portions of large roasts may not be exposed to sufficient heat to kill the bacilli.

"When on post-mortem examination the disease is found to be generalised, the carcase should be put into the rendering vat; the diseased viscera and tubercular masses should be burned or buried deeply in lime. No restriction is necessary on the sale and removal of hides, horns, hoofs, or hair.

"Insurance.

"At the Seventh International Veterinary Congress, heid at Baden-Baden two years ago, Professor Siedamgrotzky suggested a system of insurance which, if it could be carried out, would be a common-sense way of lessening individual losses consequent on eradication by slaughter of clinically diseased and reacting animals. This is, however, surrounded by many practical difficulties, yet it is well worthy of the consideration of this Congress. An effort should be made to provide an indemnity fund by this or some other way, the public purse contributing a liberal share; otherwise, I fear the progress made in eradication will be slow.

"In the State of Illinois, United States of America, indemnity is paid by the State on a plan which is worthy of imitation. A maximum value is fixed at, say, £15. Diseased cattle are classified as follows after being slaughtered:—

	Indemnity.
Class A, in which no lesions are found .	full appraised value.
„ B, in incipient stage . . .	75 per cent. appraised value.
„ C, infected for one year . .	50 per cent. „ „
„ D „ „ two years . .	35 per cent. „ „
„ E „ „ three „ . .	25 per cent. „ „
„ F „ „ over three years .	15 per cent. „ „

"Should the proceeds of the sale of the carcase exceed the percentage valuation, the owner is paid the full amount so received.

"SUGGESTED LEGISLATION.

"No legislation will accomplish the end in view unless the measures are such that the public are in sympathy with them rather than antagonistic to them.

"I. Tuberculosis should be included in the list of contagious diseases.

"(*a*) Tuberculous animals should consequently come under the provisions of the Animals Contagious Diseases Act; but the Local Authorities should have power to allow the sale and movement of such parts of the carcases as are known not to carry contagion, such as hides, hoofs, horns, and hair, thus preventing unnecessary loss.

"II. All foreign animals admitted for breeding or dairy purposes should be tested by the tuberculin test. Tuberculous animals should be prohibited from entering.

"III. Tuberculin should be controlled, and none but qualified veterinarians be allowed to use it; and all reacting animals should be reported, marked, and quarantined.

"IV. All animals showing clinical symptoms of tuberculosis, especially disease of the udder, lungs, uterus, or bowels, should be killed at once, and all scrub and grade animals reacting should be killed within six months. Pure-bred cattle may be bred from under Bang's system, in quarantine for life.

"V. All testing, other than imported animals, should be by voluntary application for a test of the entire herd, and the expense should be borne by the State. A reaction of 2 degrees to be understood to indicate tuberculosis, 1½ degrees as suspicious. Suspicious animals to be quarantined and re-tested in three months, unless clinical symptoms develop, when they would be at once condemned. The Government to have the right to order re-test when considered necessary.

"VI. Disinfection of premises should be ordered by special regulations the carrying out of which will be superintended by Government officials.

In conclusion, he said he was convinced that more tuberculosis was to be found in the dairy cows than in oxen, because the former were kept as long as they paid while the latter were prepared for the slaughter-house at the earliest possible moment, so that their life seldom extended beyond two or three years. He maintained that one of the principal reasons for cows suffering from tuberculosis was because they were longer housed. As to the idea that infection was brought about through eating flesh, he was of opinion that that was an extremely rare occurrence.—(Applause.)

Mr. WILLIAM DUTHIE said he was one of a goodly number who came from Scotland to this Congress, the subject being one of vital importance to them as breeders, feeders, and agriculturists. He fully appreciated that they were present for the purpose both of getting information and of lending what little influence they had towards the stamping out of a most serious disease. Anything which he and his confreres proposed to ask was not in a narrow and selfish spirit, but on the important ground of the public good. He and many others whom he knew at the Congress had much enjoyed the papers which had been placed before them, and none had interested him, as a breeder of cattle, more than that which had just been read, and his opinion was that such an important matter should be widely diffused, more especially among breeders and feeders of cattle. He agreed that byres should be cleansed and disinfected directly the cattle were turned into the open, as was invariably done in Aberdeenshire and other parts of the north. He did not think that in his district cattle were allowed sufficient exercise in the open air. That was accounted for to a great extent by the severity of the winters. They were very careful in the use of the milk, not only as to its use by human beings, but by calves also.—(Hear, hear.) Touching the use of meat, he thought there was too much of scare in

that regard, believing as he did that there was very little danger from well-nourished carcases, even though they showed a slight spot of tuberculosis. In conclusion, Mr. Duthie said he considered it of vital importance to have a regular system of inspection.—(Applause.)

Professor NOCARD (Alport, France), who spoke in French, thought the statement of Dr. Koch of the highest importance both to veterinary surgeons and agriculturists. He pointed out the necessity for legislative measures for preventing the increase of tuberculosis among cattle, which he said was on the increase. The leading causes of tuberculosis in animals he thought were bad food, excessive exertion, bad sanitation, and especially prolonged lactation. Contagious diseases in animals such as rinderpest, pleuro-pneumonia, swine fever, mange, and variola were all legislated for, but singular to say tuberculosis was not. He advocated the use of the tuberculin test, and the compulsory slaughter of clinically affected animals. He also advocated legislation in connection with butter manufactories and industries dealing with milk and the products of milk, compelling them to adopt sterilisation of the products.—(Applause.)

Professor THOMASSEN, who also spoke in French, said he had made certain experiments, and gave four cases in which he had inoculated animals with tuberculosis from the human being and the results made him differ from Professor Koch. He gave a *resumé* of proposed legislation to be carried out in Holland which placed the manufacture of tuberculin under the control of the State.—(Hear, hear.) It was not to be given free, and the use was not to be free. Then, again, animals with clinical tuberculosis were to be destroyed, those who were reacting were to be segregated, while the opinion was expressed that factories dealing with milk products ought to be compelled to sterilise those products, and the importation of animals affected was to be interdicted.

Colonel NUNN said he spoke on the subject before the Congress as a barrister and a veterinary surgeon, and as veterinary surgeons and stock-owners the question arose before them, Is it desirable to eradicate this disease or not? On all hands it was universally agreed that it was desirable to do so. The matter of legislation was, to a non-legal person, slightly misleading, and he explained that certain sections of the Public Health Act conferred power on the Government to act, and it was their bounden duty to educate the public up to the point, and then agitate until the executive were forced to give way and pass more stringent laws on this vitally important matter.

Professor EDGAR said the veterinary profession of this country had for many years been advocating the enforcement of enactments against tuberculosis, and he was sure that they were unanimous at the present time upon the point. With regard to educating the public up to it, his belief was that they might do so for twenty or thirty years, and yet they would not be much further ahead than they were now unless legislative steps were taken. —(Hear, hear.) If anything satisfactory was to be done restrictive measures must be universal and uniform, and not left to the "may if they think fit" of the Local Authorities.—(Hear, hear, and applause.) Whatever powers were given from the Central Authority in the land, they should be administered by Local Authorities to ensure promptness and stimulate local interest in the suppression of the disease. Referring to the way in which tuberculosis was spread about, he strongly deprecated the

practice of using carcases for manure, and especially allowing the hair to mix with the soil on a farm where the stock were allowed to graze. Undoubtedly the bacilli was taken into the system of the stock so grazing, and evil results would follow. In conclusion Professor EDGAR said he had good authority for saying that from 30 to 40 per cent. of the cattle of the country were tuberculous.

Professor DEWAR said there had been a great deal of exaggeration as to the expense likely to be incurred by any individual breeder endeavouring, without obtaining fresh legislation, to stamp out the disease. He advocated farmers and breeders acting on their own initiative, and said he felt sure that it would not turn out to be so expensive a process as some people thought. He had been entrusted with the testing of a herd of valuable breeding animals for the purpose of eradicating suspected tuberculosis from it. His advice was, from his experience of that experiment, that in the case of calves of reacting cows, they should be allowed to suck their dams, that they should not be penned up beside them, but be allowed plenty of fresh air and exercise, and that on being weaned and housed in the autumn they should be kept entirely separate. There had been the tuberculin test, and he held that in this particular case the result was a profit to the breeder. In conclusion, he said he could assure breeders that there was little use for a veterinary surgeon in a herd which was thoroughly tested as he had tested the particular herd in question, there being fewer abortions, fewer ingestions, and less disease of all kinds.

Mr. WILLIAM HUNTING, confining himself to the subject of legislation, said it was true there was some in regard to tuberculosis, but it was very little, and that was confined entirely to the protection of the human subject against meat and milk. Anybody who read the reports of medical officers of health and the number of prosecutions which had failed, would see that the whole thing was an absolute farce.—(Hear, hear.) Four-fifths of the inspections were carried out by men who knew nothing about it, and nearly the whole of the other fifth by men who knew too much, with the result that the medical officers of health in many towns condemned animals if they had only one nodule in their lung, or, as Professor M'Fadyean had said the previous day, if it had only a few grey tubercules or a little nodule. For an absolutely local disease the whole carcase was oftentimes seized. The present state of the law, or rather the almost entire absence of any law dealing with tuberculous udder in cows, was a scandal and reproach to civilisation. Of course he recognised that there were some difficulties in the matter of legislation, and he agreed that one of the greatest obstacles was the ignorance of the laity, and the eternal reiteration of that ignorance by both experts and the authorities. His view was that this disease ought to be put into the Diseases of Animals Act, and scheduled according to the existing Act of Parliament; let notification be required, and that notification would cover not only the udder cases, but any other symptoms shown by the animals. It would thus affect the disease in the hands of the breeder, where it in reality started; then it would affect it in the hands of the feeder, where it was continued; and it would catch them in the hands of the cow-keeper and butcher. At present every other country had some legislation against tuberculosis, but we in the United Kingdom, in our insular ignorance, had none.—(Cheers.)

Dr. CHARLES PORTER then read the following paper:—

THE CHANGES REQUISITE IN EXISTING LEGISLATIVE AND ADMINISTRATIVE MEASURES FOR IMPROVING THE CONDITION OF COWSHEDS, AND ENSURING THE HEALTH AND CLEANLINESS OF MILCH COWS.

BY CHARLES PORTER, M.D., BARRISTER-AT-LAW, D.P.H. CAMB., COUNTY MEDICAL OFFICER OF HEALTH FOR SHROPSHIRE, AND A VICE-PRESIDENT OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

"Before venturing suggestions as to legislative changes it is necessary to consider what legal provisions already exist for these purposes. They are :—

"1. The Dairies, Cowsheds, and Milkshops Orders, 1885 and 1886.

"2. The Contagious Diseases (Animals) Act, 1886, Sec. 9 (4) and (6).

"3. The Infectious Diseases (Prevention) Act, 1890, Sec. (4).

"4. The Regulations made under the above Orders.

"5. The Tuberculosis clauses of certain Local Acts.

"*The Dairies, Cowsheds, and Milkshops Order of* 1885 (for offences against which the Order of 1886 provides penalties) is made under the Contagious Diseases (Animals) Act, 1878, Sec. 34, and (briefly) provides for the registration, sanitary construction and maintenance of dairies and cowsheds, and the making of regulations for their good ordering, and for the inspection of cattle (Art. xiii. (a)). It also prohibits the use of milk from a diseased cow "for food of swine or other animals unless and until it has been boiled' (Art. xv. (c)). But the Order generally only applies to the diseases scheduled under The Contagious Diseases (Animals) Acts, of which tuberculosis is not one ; and though the Dairies, &c. Order of 1899 extends the 1885 Order so as to prohibit the mixing of tubercular milk with other milk, and its sale or use for human food, it does not apply at all to the regulations for inspection of cattle in dairies, or the use of unboiled tubercular milk as food for other animals. Thus, at the outset, one is met with the *astonishing fact that a sanitary authority has no power to make regulations for the inspection of tubercular cattle in dairies, and no power to prohibit the feeding of animals on tuberculous milk*, although we know that swine are specially susceptible to tuberculosis, and that the great majority of calves that become infected are infected through the milk of tuberculous mothers (Report Royal Com. 1898, par. 14 and 50).

"Surely the Dairies, &c. Order of 1899 was unintentionally limited in its application.

"*The Contagious Diseases (Animals) Act*, 1886, Sec. 94, gives a local authority's officers right of entry on premises within the authority's district for the purposes of the Dairies, &c. Orders. But, as the Act does not apply to tuberculosis, *the second surprising fact appears, viz., that the officers of a sanitary authority have no legal right of entry into any cowshed in reference to tuberculosis in the cattle therein.*

"Outside its own district a sanitary authority has apparently no power to inspect milch cows, either in regard to tuberculosis or any other disease, even though the owner of the cows is registered in its district as a milk-seller, and sells such cows' milk therein. The benefit of registration is thus largely lost, as an enlightened district may be left at the mercy of an apathetic one. Clearly, therefore, statutory powers are required for the inspection of milch cows, in regard to tuberculosis or any other disease, by the officers of any authority within whose district milk from the cows in question is supplied.

"The 1886 Act also makes the rural and urban sanitary authorities the local authority in their districts, in place of the previous "county authority," viz., the Justices in Quarter Sessions, of whom, in administrative matters, the County Councils are the successors.

"It thus comes about that, although the *County Council* are still the Local Authority under The Contagious Diseases (Animals) Act, they *have absolutely no powers in regard to dairies and cowsheds, nor in reference to tuberculosis*, because it is not scheduled under that Act. Consequently, the Shropshire County

Council, when recently invited to take action in obtaining concerted veterinary inspection of milch cows, and in providing facilities for tuberculin testing, found itself absolutely powerless to do or spend anything for this purpose.

"County Councils should certainly receive statutory powers in the directions indicated, and, as in regard to rivers pollution prevention, analysis of food and drugs, and housing of the working classes, they should possess, in respect of dairies, cowsheds and milkshops, direct executive functions concurrent with those of the local sanitary authorities.

"*The Infectious Diseases (Prevention) Act*, 1890, Sec. 4, gives the Medical Officer of Health powers of inspection of dairies *in his district* and of the animals therein, if there is evidence that any person is suffering from disease attributable to the milk therefrom. Similar inspection of *outside dairies* may be made on a Justice's order.

"This measure primarily protects the consumer, but, secondarily, tends to improve the conditions of cowsheds and cows. Unfortunately, however, the word 'disease' is limited here to 'notifiable infectious disease,' which does not include tuberculosis.

"*The latest Regulations under the Dairies, &c. Order*, dated March 1899, when tested by the Royal Commissioners' structural recommendations as to cowsheds, are apparently satisfactory, though other codes, *e.g.*, that of Manchester, are much more explicit and detailed. In regard, however, to cubic space requirements, the Model Code does not meet with unqualified approval on all sides. It divides cowsheds into two classes. The first consists of those 'the cows from which are habitually grazed on grass land during the greater part of the year, and, when not so grazed, are habitually turned out during a portion of each day'; for these, which may be described as 'country cowsheds,' nothing whatever is specified about cubic space. For the second class, which includes all other cowsheds, and may be termed the 'town cowsheds,' 800 cubic feet of air space per cow is suggested as the proper allowance. The omission to *specify* cubic space requirements in rural districts is presumably a consequence of the Royal Commission's finding that physical circumstances vary so much in different rural localities, that it is not practicable to prescribe a uniform minimum; but this hardly explains the absence from the Model Code of any *reference* whatever to cubic space, for the Commissioners recommended 'such space per cow . . . as would . . . secure reasonable ventilation without draught.' This is an unfortunate difficulty in the Regulations, for it has been truly said that 'by far the worst constructed, worst ventilated, and the dirtiest cowsheds are to be found in villages, hamlets, and rural areas.' Moreover, as pointed out by Dr. Niven, milch cows in towns are mostly young, are kept for one year only, and are then slaughtered, whereas milch cows in the country are, for breeding purposes, kept very much longer, often under much less favourable cowshed conditions, have a longer time in which to develop tubercle, and, as a matter of fact, suffer from it more frequently, as Manchester and Liverpool statistics have very clearly shown, the actual proportions of infected town and country milks being 13·4 to 5·2.

"With regard to the *objectionable practice of placing cows with their nostrils close to the wall*, and thus minimising their chance of breathing fresh and moving air, no regulation exists, and there would not appear to be any statutory power to frame one, unless (which seems doubtful) it could come under the heading of 'regulating ventilation.' Mr. John Speirs, one of the Royal Commissioners, himself found that the air at the head of such stalls was usually more polluted than elsewhere, and it is precisely at this point that a sufficiency of moving air should be provided if infection from cow to cow is to be prevented. This may be effected by having a 4 ft. passage or fodder-arm at the heads of the cows.

"Valuable suggestions as to cowshed construction have been issued in Sheffield by Dr. Harvey Littlejohn, and in Manchester by Dr. Niven, and some memoranda issued in Stockport in 1897 by the writer are appended hereto.

"*The Tuberculosis Clauses of* 1899 (Manchester, Stockport, Derby, &c.) provide for: (1) Notification of actual or suspected tuberculosis of the udder; (2) inspection of milch cows either within or without the district, and sampling of their

milk ; (3) penalties for selling milk of cows with tuberculous udders, and for failing to isolate such animals ; (4) the application, with consent of owners, of the tuberculin test to cows by a veterinary surgeon.

"These powers have been used considerably in Manchester and Derby.

"Dr. Howarth (Derby) thinks that *other restrictions are very necessary* because suspicious cows are removed immediately after a sample has been taken, and the *tendency is to create an objectionable trade in cows with doubtful udders.*

"Dr. Niven (Manchester) considers the clauses undoubtedly valuable, and that they have brought about the removal of over forty cows with tuberculous udders from dairies supplying milk to Manchester. Like Dr. Howarth, however, he points out that there is nothing to prevent the sale of a milch cow, which the owner knows to be tuberculous, to some other party who may continue to use it for milk-producing purposes. This difficulty appears obvious, and the writer thinks it can only be met by measures such as some of those applicable under The Contagious Diseases (Animals) Acts to pleuro-pneumonia, swine-fever, &c., viz., declaration by Local Authority of 'infected places,' out of which the infected animals must not be moved, together with power to test with tuberculin, and, if reaction follows, to slaughter.

"This power to slaughter is recommended by the Royal Commission, 1896, and at once raises *the vexed question of compensation.* The Commissioners think that if, *post-mortem*, the slaughtered milch-cow were found to be free from tuberculosis, the owner should be paid its full value, but if tuberculosed, then only the proceeds of the sale of the carcase. As it is impossible to detect localised tuberculosis in the living animal from its outward appearance, and as there may possibly be no outward sign of even generalised tuberculosis, the latter proposal would often involve great loss and hardship on the owner. Whilst, therefore, no compensation should be given for a carcase with general tuberculosis, one ventures to think that, for a limited period after the public provision of facilities for tuberculin testing, a *via media* should be taken in regard to an owner of a milch cow with *localised* tuberculosis, who can prove that within a reasonable time of slaughter he gave a fair price for the animal, and that he could not then have reasonably known or suspected that the animal was tuberculous.

"According to M'Fadyean (Min. Evid. Royal Com., 1896, par. 1256), 'It is exceedingly rare for a cow to be attacked with tuberculosis in the udder first ; it is also rare to get a cow that has tuberculosis of the udder and only slight tuberculosis elsewhere. Tuberculosis of the udder is usually found in advanced cases of tuberculosis. Even if all cases of tuberculosis in cattle were allowed to die . . . only a small percentage of them would ever get tuberculosis of the udder.' If this be true, no compensation would be necessary in regard to most cows with tuberculous udders, as they would be suffering from generalised tuberculosis.

"It is said that compulsory slaughter and compensation have been a costly failure in Belgium and elsewhere, *e.g.*, Massachusetts, but it is not clear whether Belgian procedure was controlled by the tuberculin test, and even if it were, improved technique has given it a present value it did not then possess. And though the Royal Commissioners condemned as impracticable for tuberculosis the methods under The Contagious Diseases (Animals) Act by which pleuro-pneumonia has been stamped out, they nevertheless recommended compulsory (par. 43) slaughter. If to this be added the very necessary and reasonable powers of prohibiting the removal of suspected animals and the endowment of County Councils with executive powers, something closely resembling the machinery of The Contagious Diseases (Animals) Act *without compensation* is evolved. But, until this compensation question is settled, the powerful agricultural and meat trade interests of the kingdom are, the writer is convinced, strong enough to block any proposed legislation for dealing effectively with bovine tuberculosis.

"*Elimination of Tuberculosis from Herds by means of tuberculin testing.*—The successful experience of Denmark led the Royal Commission to recommend

that the Board of Agriculture be empowered to provide gratuitous testing of stock whose owners will undertake to keep them under satisfactory conditions and to isolate reacting animals. If, in addition, the calves of tuberculous mothers be fed on boiled milk, if healthy aminals be re-tested once or twice a year, and if purchased animals be only beasts which have withstood this tuberculin test, Prof. Bang believes that a markedly affected herd may be replaced by a healthy one. The writer ventures to think County Councils and County Borough Councils, who already have to provide a veterinary staff for the purposes of The Contagious Diseases (Animals) Act, might, with advantage in suitable cases, have the power of providing gratuitous tuberculin tests delegated to them by the Board of Agriculture.

"*Official registration* and the *branding* of cattle which have withstood the test have been suggested, but branding, at any rate, is open to the objection that tuberculosis may develop after the performance of the test, whereas the brand would be apt to be regarded as a permanent hall-mark of soundness.

"Dr. Meredith Young has called attention to the *fraudulent use of tuberculin for 'fortifying'* tuberculous animals against a subsequent application of the test. This, of course, ought to be penalised. He has also suggested that imported animals should not be landed in this country until they have first passed the tuberculin test. But are not, practically, all these animals immediately slaughtered, and their carcases inspected, at Birkenhead or Deptford?

"*Protection of Inspecting Officers.*—In any legislation for dealing with tuberculosis, it is most essential that a clause should be inserted similar to sect. 265, Public Health Act, 1875, for the protection of all medical, veterinary, or other sanitary officers from personal liability in respect of anything done *bonâ fide* for the purposes of such legislation.

"*To summarise briefly:*—

"I.—General legislation is urgently necessary for the following purposes:—

"1. Inasmuch as no such powers already exist in reference to tuberculosis to empower urban and rural sanitary authorities to inspect, in regard to tuberculosis and any other disease, cows and cowsheds, wherever situated, from which milk is supplied to their districts.

"2. To endow County Councils with concurrent powers.

"3. To amend and extend the provisions of the Dairies, &c. Order of 1885 so as (1) to make applicable to tuberculosis its regulations concerning the inspection of cattle; (2) to prohibit the use of milk from tuberculous udders as food for animals unless first boiled; (3) to provide for a sufficiency of moving air at the heads of milch cows kept in cowsheds.

"4. To empower the Board of Agriculture to provide, on specified conditions, for free tuberculin testing of the stock of all assenting owners, and to delegate where desirable the administrative details to County Councils and County Borough Councils.

"5. The application to the kingdom generally of powers on the lines of the tuberculosis clauses of various local Acts, with the further powers of prohibiting the removal of suspected animals and of applying the tuberculin test.

"6. The compulsory slaughter of all reacting animals, as it is impossible, except by an almost impracticable system of espionage, to ensure their isolation and the disuse of their milk.

"7. The payment of *full* compensation when the slaughtered animal is found to be *free* from tuberculosis, and of substantial *partial* compensation when the disease is localised, but only in such cases.

"8. Penalising the fraudulent use of tuberculin for 'fortifying' purposes.

"9. Protecting from personal liability sanitary officers acting *bonâ fide*, as per sect. 265 of Public Health Act, 1875.

"II.—*Administrative changes* as implied by the legislative proposals just enumerated, and in addition—

"1. Reference in the Model Regulations to some cubic space requirements for cowsheds in sparsely populated localities.

"2. Periodical veterinary inspection of milch cattle.

"3. Dissemination amongst farmers and cow-keepers of information in regard to bovine tuberculosis, and especially in reference to the value of the tuberculin test and the importance of feeding calves on wholesome milk.

"COUNTY BOROUGH OF STOCKPORT.

"MEMORANDA *re* COWSHED INSPECTION, &c.

"***Effectual lighting:*** 3 sq. ft. window-space per cow required *in Sheffield.*

"*Adequate ventilation:*—

"(*a*) *Inlets: lowered openings*, or *windows* falling in at the top, in walls at two opposite sides of the building.

"(*b*) *Outlets: extraction shafts* in centre of roof, or, if one wall be without window or other opening, extraction shaft to be as near thereto as possible.

"*Adequacy may be tested:*—

"(*a*) By absence of oppressive smell when cows all housed.

"(*b*) Estimation of CO_2 in air of cowshed.

"800 *cub. ft. free air space* should be allowed per cow.

"*Floors* of (1) concrete floated over with cement; (2) asphalt; (3) flags with cemented joints.

"*Should fall* to central *channel* leading to opening, *outside cowshed*, of trapped drains.

"*Width* not less that 14 *ft.*, and, if possible, 18 *ft.*

"*Fodder-arm* = 4 ft.

"*Stall* = 8 ft.

"*Dung-trough* = 2 ft., with fall of 3 ins.

"*Central channel* = 6 ins.

"*Passage at back* = 3 ft. 6 ins.

"*N.B.—Each cow should have a separate stall* if possible.

"*N.B.—Each stall should have a separate stoneware manger trough.*

"*Note.*—In Sheffield *that portion of each stall between the manger and the heelstone is allowed to be made of clay*, as some cowkeepers insisted that if all flags or concrete cows would suffer from inflammation of knees.

"*Walls* to height of 7 ft. to be lined with impervious and easily cleansed material, *e.g.*, Portland cement.

"*Ceiling* to be tongued and grooved if forming floor of hayloft, but in new buildings no loft should be allowed over cowshed.

"*Water Supply.*—Byelaws require adequate *supply of good water cisterns* to be of slate or metal and conveniently placed. In *new* cowsheds, service-pipe should convey water along head of stalls, with movable branch-pipe to each trough.

"*Manure-midden should not communicate directly with cowshed.*

Mr. ARMITAGE (Nottingham) spoke as a butcher and farmer, giving an instance where the ignorance of an inspector was the cause of the slaughter "right and left" of a valuable herd, which he maintained was entirely unjustified.

Mr. POTTIE (Paisley) said he did not see how people were to be educated on the matter. Were they to give them the education of Professor M'Eachran, who said one thing, or the education of Professor Koch, who said something distinctly opposite?

Mr. F. C. LLOYD, Chemist and Bacteriologist to the British Dairy Farmers' Association, said he had listened with surprise to the extreme views which had been put forward by many speakers at the Congress. For instance, one gentleman had said that the milk used for cheese-making ought to be sterilised, apparently not for a moment knowing that it was absolutely impossible to make cheese from sterilised milk. He was also

surprised not to have heard one word said about the other diseases which milk was said to propagate, such as small-pox, typhoid fever, &c. If they at once took steps to get rid of tuberculosis, they would at the same time get rid of the danger of the other diseases, and besides preventing danger to the public, they would be getting rid of that which was both unprofitable and destructive to the farmer. If the veterinary profession had only been unanimous in the past and spoken in one voice, there would not now be all this difficulty in educating the farmer to realise that it was his duty to eradicate the disease. There ought to be legislative measures to get rid of tuberculosis, but he hoped they would not attempt to get them in the way some had proposed, otherwise the Legislature and the public would be opposed to them, and instead of doing the good which was desired, by going to extremes they would spoil the end they had in view

Mr. J. S. LLOYD (Sheffield) said his experience as a veterinary inspector was that the great difficulty as to cows which were kept for supplying milk was to get cowkeepers to ventilate their byres, in fact a vast number would not do it. A great deal depended on how the ventilation was carried out. During the eighteen months he was Veterinary Inspector for Manchester his duty was to a large extent the inspecting of cows, and he came across fifty-two with tuberculous udders. Twenty-six were slaughtered, but the other twenty-six were not, because there was no power to compel the owners to kill them, and persuasion was of no avail. Out of the twenty-six not slaughtered only eight were known to the authorities in Manchester; the other eighteen have been spread throughout the length and breadth of the land, and no definite evidence with regard to them was known. Under section 116 of the Public Health Act, inspection of meat was confined to medical officers of health and inspectors of nuisances. With all deference to the latter and to sanitary inspectors, they were not trained, or had not been until very recently, in the inspection of meat —(hear, hear)—and he contended most strongly that the inspection should always be carried out by men who thoroughly understood it. He entirely disagreed with the Meat Traders' Federation where they joined issue with the agriculturists in asking for compensation for animals having tuberculous udders. The matter of compensation for this was dealt with by the last Royal Commission, and he entirely agreed with their recommendation, viz., that if the udder was found after death not to be diseased, full compensation should be given; if found diseased, and yet the carcase was fit for food, the value of the carcase should be given; but if unfit for food, no compensation should be paid at all. He agreed with compulsory notification.

In reply to Mr. Morgan the PRESIDENT said no resolution could be passed at that meeting; but that if any were given to him he would submit them to the Committee, who would thoroughly criticise and deal with them as they thought fit.

Professor M'EACHRAN then replied on the discussion, saying that he still adhered to the communicability of tuberculosis from animals to man. As an instance he related a case in Canada not long ago. The medical officer of health of Winnipeg told him of a farmer having settled on the prairie in the eastern part of the dominion, so far away from another settlement that there was even no school or church there. There seemed to be no possibility of contracting the disease, and when the family went there they were perfectly healthy. After a time the two children, who were fed

largely on milk, became ill, gradually got worse, and ultimately died from tuberculosis. The parents, who had not taken much milk, remained healthy. Then, when an examination was made of the cattle, they were found to be suffering from advanced stages of tuberculosis. He gave another instance where the farmer and one of his children died from tuberculosis, and a dog belonging to the widow showed symptoms of it, and when destroyed was found to be similarly affected. When such cases came constantly before them they must come to the conclusion that there was communication. He admitted it was not positive proof, but it was practical, and they could not, at the present stage, even in the face of Dr. Koch's announcement, rid their minds of what he had said in his paper.

The PRESIDENT said that before they separated he should like to take the opportunity of expressing his great satisfaction at the very large and enthusiastic audiences which this section had attracted. He had no idea, in the first instance, that they should get anything like such gatherings. He held it to be a mark of the interest which the agriculturists and the tradesmen were taking in the matter, and he hailed with something like delight the assertions that had been made over and over again, that the trader, the meat salesman, as well as the farmer, were quite convinced of the great importance of taking every possible precaution for the purpose of getting rid of the disease in the lower animals. He had already expressed his sympathy with them in the injustice to which they occasionally had to submit in the seizure of carcases of animals which were only suffering from localised tuberculosis, and as a member of the two Royal Commissions he did the best he possibly could.—(Hear, hear.) In the first Commission he wrote and signed a separate Report to call attention to the fact that these injustices were being perpetrated, and four or five years later he did the same thing on the second Commission; and in the recommendations of the Commission it was as distinctly stated as it was possible for the English language to state anything, that a large quantity of useful meat was sacrificed to the incompetentcy of the men engaged in the inspection.—(Hear, hear.) If there was no scheme formed as the result of the recommendations, he called on those present at that Congress to witness that it was not their fault. The Commission had no powers beyond the powers to suggest what ought to be done, and leaving it to the public to see that as soon as possible something should be done.

On the motion of Mr. St. John Ackers, seconded by Mr. Bowen Jones, a hearty vote of thanks to their excellent chairman, Sir George Brown, and the Section then terminated.

Notes and News.

THE BOARD OF AGRICULTURE AND VETERINARY INSPECTORS AT MARKETS.

On July 9th, in the House of Commons, Mr. Loyd, M.P. for North Berks, asked the President of the Board of Agriculture whether the Board had been confirmed in the view expressed in the Board's circular letter to Local Authorities in Great Britain of January 5th, 1895, as to the desirability of veterinary supervision over animals exposed for sale at public markets, in order that diseased animals may be detected and properly dealt with;

and if so, whether any further steps are necessary or can be taken to promote the general adoption of arrangements of the kind.

Mr. HANBURY.—The opinion of the Board is as strong as it was in 1895 as to the necessity for veterinary supervision by the local authorities over animals exposed for sale at their public markets, and I regret that these authorities as a rule have not during the six years which have elapsed taken any adequate steps to secure such supervision. This omission frequently leads to the closing of our markets where disease is found to be rife, which might be avoided if due precautions were taken by the local authority. I propose to issue a further circular to Local Authorities on the subject.

Mr. LOYD.—Will the further circular to the Local Authorities include a clear statement of the principles on which the Board acts in ordering slaughter and compensating owners?

Mr. HANBURY.—Yes, I see no objection to making such a statement a part of the circular; but of course the statement would not be favourable to any extensive system of compensation.

IMPORTATION OF AMERICAN HORSES.

In the House of Commons on Thursday, July 11th, Mr. R. T. Hermon-Hodge asked the President of the Board of Agriculture whether he was aware that an epidemic of infectious fever, resembling influenza, is prevalent amongst horses in New York; and whether, in view of the fact that more than one-half of the horses imported into this country come from the United States of America, he can inform the House what steps are being taken at our ports to discover and, if possible, to check the importation of infected animals.

In reply to this question, Mr. Hanbury stated: In answer to inquiries through the Foreign Office as to the reported epidemic amongst horses in New York, I have received the following telegram:—"Mild and local epizootic laryngeal influenza prevalent in New York and Brooklyn. Horses for export to United Kingdom, which are chiefly drawn from Western and Middle States, appear to be unaffected. All horses are examined before shipment by Government inspectors, and as yet none are reported to have been rejected; they are kept in Government stockyards and have little chance of infection." The Local Authorities at most of the principal ports are continuing to inspect imported horses as they arrive. At the port of London we are taking steps to supplement the information obtained at the other principal ports by inspection on the part of our own officers. Upon the results of this inspection will depend the question whether there is sufficient evidence of disease to require further administrative action.

XUM

CONTAGIOUS DISEASES ANIMALS ACTS, 1864 AND 1890.

SUMMARY OF RETURNS OF OUTBREAKS for the Five Weeks ending 20th July 1901.

ENGLAND AND WALES.

Swine Fever.	Anthrax.	Glanders (including Farcy).	Sheep-Scab (for month of June).
Outbreaks 467 Slaughtered 2249	Outbreaks 37 Attacked 54	Outbreaks 138 Attacked 201	Outbreaks 9

SCOTLAND.

Outbreaks 16 Slaughtered 88	Outbreaks 13 Attacked 13	Outbreaks 4 Attacked 11	Outbreaks 2

IRELAND.

Outbreaks 34 Slaughtered 500	None.	Outbreaks 1 Attacked 1	Outbreaks 7

Communications, Books, Journals, &c., Received.

Agricultural Journal (Cape of Good Hope); Berliner Thierärztliche Wochenschrift; La Clinica Veterinaria (Milan); Deutsche Thierärztliche Wochenschrift; Tannoform in Veterinary Medicine (March); The Sanitary Journal; Scottish Medical and Surgical Journal; Veterinary Record; La Riforma Veterinaria; Le Mois Scientifique (Paris); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Johns Hopkins Hospital Reports; Journal of Comparative Medicine and Veterinary Archives; Recueil de Médecine Vétérinaire; Gazette Médicale de Paris; Modern Medicine; Johns Hopkins Hospital Bulletin; Il Veterinario di Campagna (Moncalieri); Le Bulletin Vétérinaire (Orleans); Revista de Medicina Veterinaria (Bucarist); La Revista Veterinaria (Buenos Aires); Zeitschrift für Fleisch-und Milchhygiene (Berlin).

Received for Review.—Horses and Stables, by Lieutenant-General Sir Frederick Fitzwygram: fifth edition, price 3s.: Longmans, Green, & Co., Paternoster Row. Veterinary Materia Medica and Therapeutics, by Kenelm Winslow, B.A.S., M.D.V.: London, Bailliére, Tindall, & Cox.